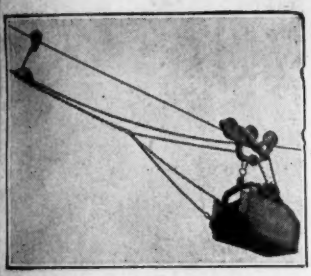
Pit and Quarry

GRAVEL • STONE

NDLING • CRUSHING • SCREENING • WASHING



THE successful operation of a dragline cableway excavator depends very much upon the bucket, the carrier and the dumping device. Sauerman excavator buckets dump from the forward end, insuring a rapid and complete discharge of the material; there are no rear gates to bend nor bind.

Our dumping devices permit of dumping the bucket either slowly or instantaneously, at the will of the operator. Our devices for dumping do not depend upon having a uniform tension on the load cable to prevent the bucket from dumping while traveling up the cableway, nor are there any latches to interfere with a speedy operation.

SAUERMAN
DRAGLINE CABLEWAY
EXCAVATORS

IF YOU want to learn of a system of excavating and conveying sand and gravel at lowest cost for labor, machinery and upkeep, you should send for our catalog describing how Sauerman Dragline Cableway Excavators dig, convey, elevate and dump materials in one continuous operation, under control of one man.

SAUERMAN BROS.

312 S. Dearborn St. Chicago

NOVEMBER, 1919

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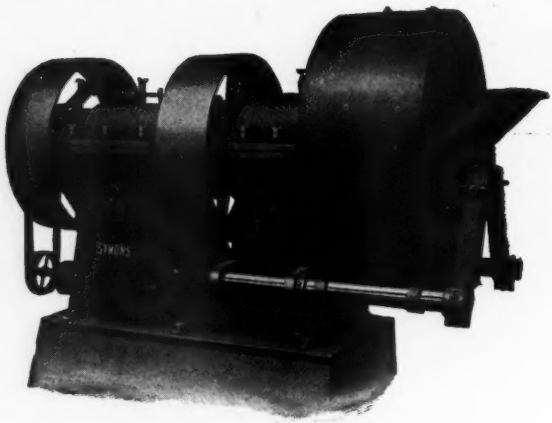
SYMONS

Disc Crushers



*Actual Results Reported by Operators Crushing Gravel.

Size Crusher	Size Feed	Size Product	Capacity Tons per Hr.	Power
18 in.	1½ in.	¾ in.	12	20 H. P.
24 in.	2 in.	½-1 in.	25	20 H. P.
24 in.	1½ in.	½ in.	15	30-40 H. P.
36 in.	2-4 in.	¾ in.	50	35 H. P.
36 in.	3½ in.	¾ in.	50	25-30 H. P.
36 in.	½-4 in.	1 in.	30	40 H. P.
48 in.	2-7 in.	1 in.	50	50 H. P.
48 in.	3 in.	¾ in.	45	

*Names supplied on request.

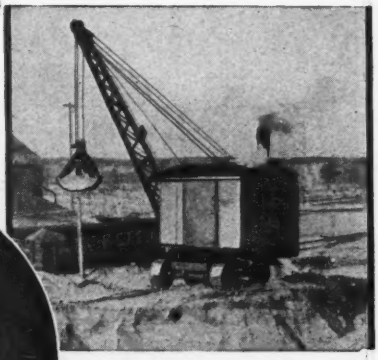
Tell us exactly what you want to accomplish. We will recommend proper crusher to use.

Manufactured and Sold by

Chalmers & Williams, Inc.

Chicago Heights, Ill.

This ERIE is equipped with a crane boom, and is handling a clam-shell with splendid results. *Owned by HURON SHORE GRAVEL CO., Saginaw, Mich.*

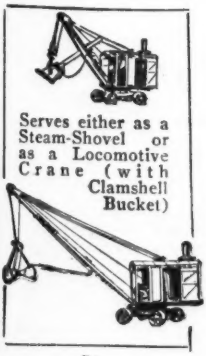


"Our Erie is giving fine service as a crane"

"We have used our ERIE for a year and a half, and we are well pleased with its efficiency and value. With a crane boom and a ¾-yd. clam-shell bucket, the ERIE rapidly digs gravel, strips, and transfers gravel from cars to stock pile and vice versa.

"It is a very useful machine, and has given us the best of service. It has cost us practically nothing for repairs." *John S. Porter, Secy., HURON SHORE GRAVEL CO. Saginaw, Mich.*

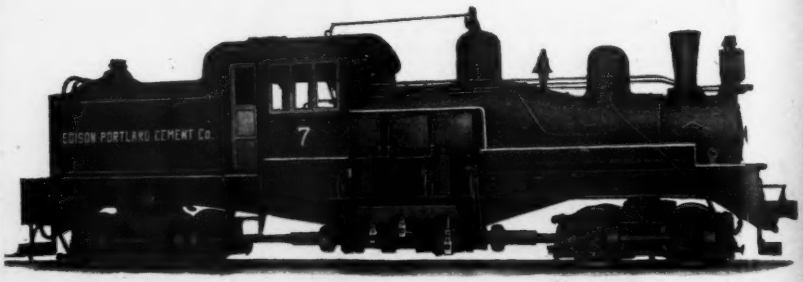
The ERIE is equally valuable as steam shovel or crane. It is built far stronger than the usual standard; it is *RELIABLE.* Bulletin Q shows what the ERIE can do. Write for a copy.



Serves either as a Steam-Shovel or as a Locomotive Crane (with Clamshell Bucket)

BALL ENGINE CO., Erie, Pa.
Builders of ERIE Steam Shovels and Locomtive Cranes, BALL Engines

ERIE Revolving Shovels BALL Engine Co. Erie, Pa.



60 Ton Shay—Edison Portlant Cement Co.

Universal "Shays"

"Shays" go anywhere a car will follow.

Compared with a rod engine "Shays" accelerate 11% quicker.

They spot cars with more accuracy.

They pull with a steady even pull from start to stop.

Best of all they give continuous service because all wearing parts are made accessible for adjustment.

When a part needs replacement it can be secured from us and applied without a drop pit or special tools.

Lima Locomotive Works, Incorporated

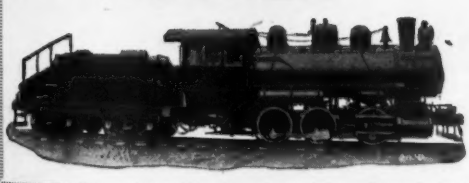
30 Church St., New York

LIMA, OHIO

Five winters of contracting work without a breakdown—even in the coldest weather.

The record sheets on this VULCAN Locomotive show that it hauled 2,000,000 cubic yards of dirt in two and one-half years, or slightly more than 2,400 cubic yards per day with an average of 32 trains and a total daily run of nearly sixty miles.

A typical VULCAN record



Vulcan Iron Works

Locomotive Designers and Builders for 48 Years

1754 Main St.

Wilkes-Barre, Pa.

50-lb Bricks on a B-G Conveyor!

EVERY man—shoveler, wheelbarrow-handler or what—you keep on your pay roll that can be replaced by a material-handling machine, will continue to be a sapper of your profits.
You can easily solve this difficulty as well as the labor-scarcity problem, and at the same time show a bigger profit on your books, by using the

B-G Standardized Conveyor

The photograph below shows a B-G Conveyor (Style B, 30'x18"), loading and unloading Granite Paving Block at the shops of the Cleveland Railway Company. The blocks weigh in most instances as much as 50 pounds. The firm considered this B-G such a big help that within 3 months after its installation they ordered two additional machines.
This efficient labor-saving machine does the work quicker, with less damage in handling and at a reduction of 50% to 90% in costs.
B-G Conveyors handle coal, coke, cement, gravel, cinders, brick, crushed stone, ashes—in fact, all sorts of package and bulk materials.
B-G Standardized Conveyors are Belt Conveyors—soundly built—portable type (12 feet to 60 feet) and stationary type (in any length)—equipped with electric drive; supplied with gasoline engine when required—operation costs low—working capacity up to 150 tons per hour.

Our Service Department will help you select the B-G Conveyor exact suitable to your needs. Write for interesting literature.

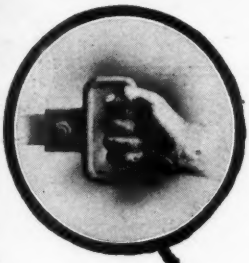
Barber-Greene Company

605 West Park Avenue, Aurora, Illinois, U. S. A.
Southern Branch, Birmingham.
Branch Service and Sales Offices:

New York	Indianapolis	Kansas City
Philadelphia	Pittsburgh	Salt Lake City
Norfolk	Scranton	Los Angeles
Salem	Chicago	San Francisco
Hartford	Milwaukee	Portland
Buffalo	Minneapolis	New Orleans
Cleveland	St. Louis	Tampa
Detroit	Omaha	Savannah
Utica		Louisville

Canadian Agents: Mussens Limited, Montreal, Winnipeg, Toronto, Vancouver

Another labor-saving device is the B-G Self-Feeding Bucket Loader, designed for severe service in handling heavy loads. The big feature is its Rotating Disc Feeder (patented). The quickest and easiest method of loading material. Write for information.



A Simple Push of the Lever of the Jeffrey Self-Propelling Loader

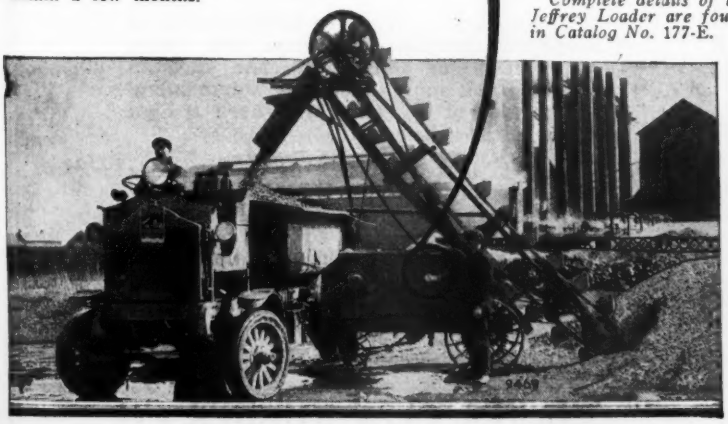
starts the buckets digging into the material, carrying it up and emptying it into your wagons and trucks.

The Jeffrey Loader is just as easy to operate as your automobile. All the operating levers are placed on one side of the loader so that one man (an ordinary yard laborer) can readily start the elevator to load or can move the machine further into the pile under its own power. To move to another pile, he throws in the reverse, backs up, and moves the loader to a more advantageous position.

Complete details of the Jeffrey Loader are found in Catalog No. 177-E.

Some Other Reasons For Using The Jeffrey Self-Propelling Loader

1. Saves from 5 to 10 men and more loading is accomplished.
2. Efficiency of teams and trucks increased.
3. Less confusion and men made more contented.
4. Men relieved of back-breaking drudgery and enabled to go on easier and more productive work.
5. Every Jeffrey Loader pays for itself within a few months.



The Jeffrey Mfg. Co. 990 North Fourth St. **Columbus, O.**

BRANCHES:

New York, Boston, Buffalo, Philadelphia, Cleveland, Cincinnati, Pittsburgh, Chicago, Minneapolis, St. Louis, Birmingham, Kansas City, Dallas, Milwaukee, Seattle, Scranton, Denver, Montreal, Detroit

Manufacturers of Pulverizing; Conveying and Elevating Machinery; Chains; Electric Trolley and Storage Battery Locomotives, etc.

CONVEYOR BELTING

Do you have a difficult job in keeping your conveying costs down?

Low initial costs don't necessarily mean you have secured the most economical belt for your individual use.

How does it check up when length of service, tonnage conveyed or loss of time for belt repairs is considered?

DESERT

Is a consistent deliverer of large tonnage of conveyed material; eliminates the costly shut downs for belt repairs and stays in service for a long time, thus commanding the respect of all users who need a high grade belt for their work.

DESERT is constructed of extra heavy duck, each ply of which is held together by a friction so strong that it resists separation to the utmost. The cover is of a quality that successfully withstands the action of sand, gravel, stone, cement and other materials being conveyed.

Let us figure on your belting requirements. Estimates and samples gladly submitted.

QUAKER CITY RUBBER CO.

Manufacturers of Mechanical Rubber Goods

Philadelphia 629 Market St. Chicago 182 W. Lake St. Pittsburgh 211 Wood St.
New York, 53 Murray St.

Conveyor Belts

From Alaska

To Mexico

From Alaska to Mexico, our engineers are constantly turning in reports on the records of Conveyor and Elevator Belts handling all classes of materials.

Every report is carefully recorded and preserved. This places us in a position to quote you intelligently on a Conveyor or Elevator Belt for your individual work.

The United States Rubber Company builds every Conveyor or Elevator Belt for the work it has to perform.

United States Rubber Company

"Very Satisfactory"

is what Holbrook & Skinner say of

The BAY CITY LOADER

For Pit and Quarry Service

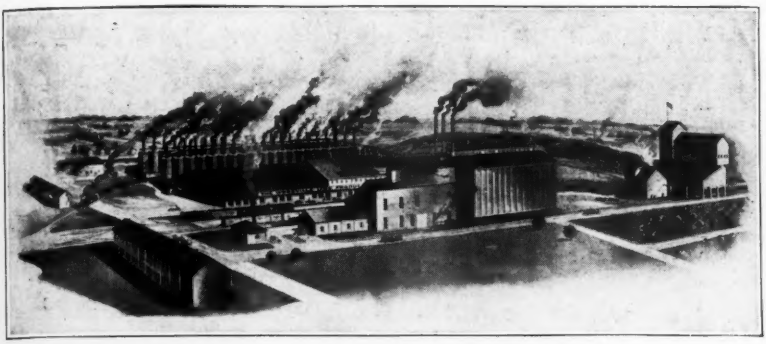
This machine is in operation loading gravel at their plant in Lansing, Mich. It is rendering excellent service and Mr. Skinner most willingly said so.

The BAY CITY Loader operates a powerful digging bucket that takes a big load at every bite. Handles a large amount of material at very low cost. Can be used for stripping, grading and loading sand, gravel or clay from bank into cars or wagons. Operating and upkeep costs small.

Write for full description.

BAY CITY DREDGE WORKS

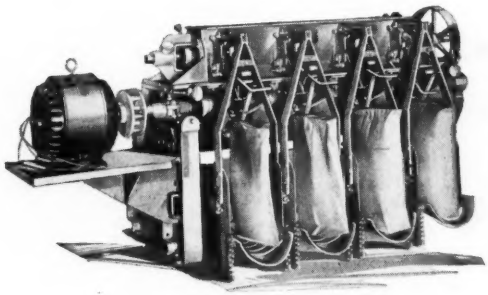
BAY CITY MICH.



THE WOODVILLE LIME PRODUCTS CO.
of Woodville, Ohio

Operate Five Urschel-Bates Packers

and *"regard them as one of the essential features in keeping down the cost and for speed in filling bags."*



The Urschel-Bates Packer

delivers the **Maximum Volume** of packed material because it makes most speed.

THE URSCHEL-BATES VALVE BAG CO.
TOLEDO, OHIO

This is BAGGING TALK No. 9. Watch for No. 10 about Minimum Payroll.

Why Pit and Quarry Operators Find "HERCULES" (Red Strand) Wire Rope Dependable and Economical

The handling of stone and gravel is, ordinarily, hard wire rope work. Not only are actual loads generally heavy but oftentimes enormous strains are encountered—when loading, for instance. Abrasion and bending stresses are always present.

It is not the strength alone of HERCULES (Red-Strand) Wire Rope that enables it to successfully meet these conditions, but it is its elasticity, toughness and durability correctly combined with its strength. Uniformity is assured by rigidly testing each wire before it is accepted for use.

The red-strand in HERCULES Wire Rope is our guarantee of quality. The rope must be right before the red goes on.

Established 1857

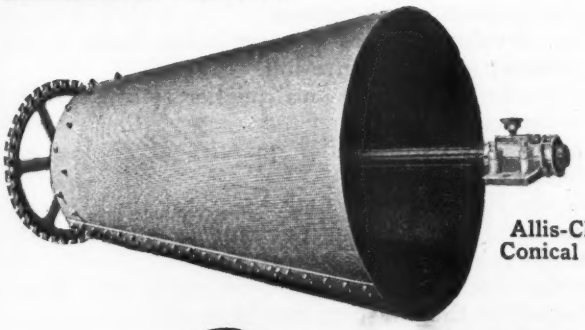
A. Leschen & Sons Rope Company

St. Louis, Mo., U. S. A.

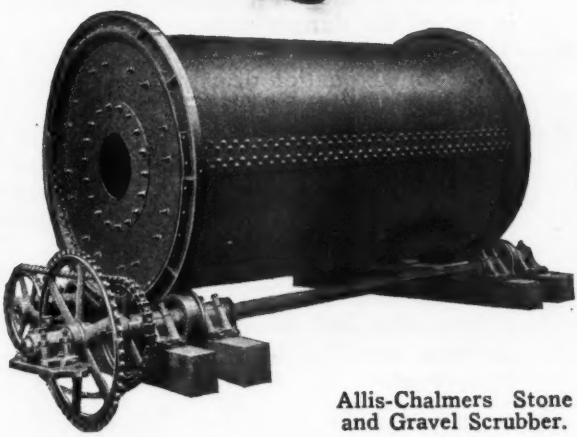
New York Chicago
Denver San Francisco

One Responsibility

We design and equip COMPLETE GRAVEL WASHING, GRAVEL CRUSHING AND GRAVEL SCREENING PLANTS.



Allis-Chalmers Conical Screens.



Allis-Chalmers Stone and Gravel Scrubber.

Write for our Bulletin No. 1436 A.B.

Sales Offices in all Principal Cities.

ALLIS-CHALMERS

Milwaukee. Wis.. U. S. A.

DU PONT AMERICAN INDUSTRIES

Nine Good Reasons for Electrical Blasting

1.—With an electric blasting machine you can fire from one to one hundred and fifty charges simultaneously.

2.—Electrical blasting allows better tamping and fullest confinement of the gases.

3.—Fuller development of the explosive force with consequent greater shattering.

4.—Less smoke and fumes and quicker return to the working face.

5.—Better results with smaller quantity of explosive, therefore cheaper.

6.—With the Rheostat and Galvanometer the electric connections can be tested to assure detonation and to avoid misfires.

7.—The shot-firer stands at a safe distance and does not operate the blasting machine until everyone is out of the danger zone.

8.—There is no need of matches, torches or open flame for detonation of explosives where electrical blasting is practiced.

9.—**The dependability of Du Pont electrical blasting equipment, that leaves nothing to chance, but gives the operator control of the entire blasting performance. Du Pont blasting accessories are correct in design and efficient in service. They are the result of practical experience and scientific research—the last word in modern, sure-fire blasting equipment.**

A free copy of our "Blasting Supplies Catalog" will prove helpful. Write for it today to Advertising Division.

DU PONT

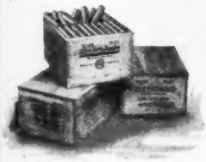
Wilmington, Del.

Visit Du Pont Products Store When in Atlantic City.

DU PONT

Explosives

for every blasting requirement



for

Road Building
Excavating
Ore Mining
Coal Mining
Quarrying
Demolition
Agriculture

More than 100 Different Kinds

Dynamite	Quarry Powder
Permissible Explosives	Farm Powder
Gelatin Dynamite	Low Powders
Blasting Gelatin	Blasting Powders
Extra Dynamite	Sporting Powders
Oil Well Explosive	Blasting Supplies

Atlas Explosives are manufactured with specific characteristics for different classes of work. The various Atlas brands differ in strength, quickness, sensitiveness, resistance to cold, fumes evolved on detonation and resistance to water, according to the requirements of the work for which the explosive is to be used. The qualities most needed in one class of work may be worthless or actually derogatory in another.

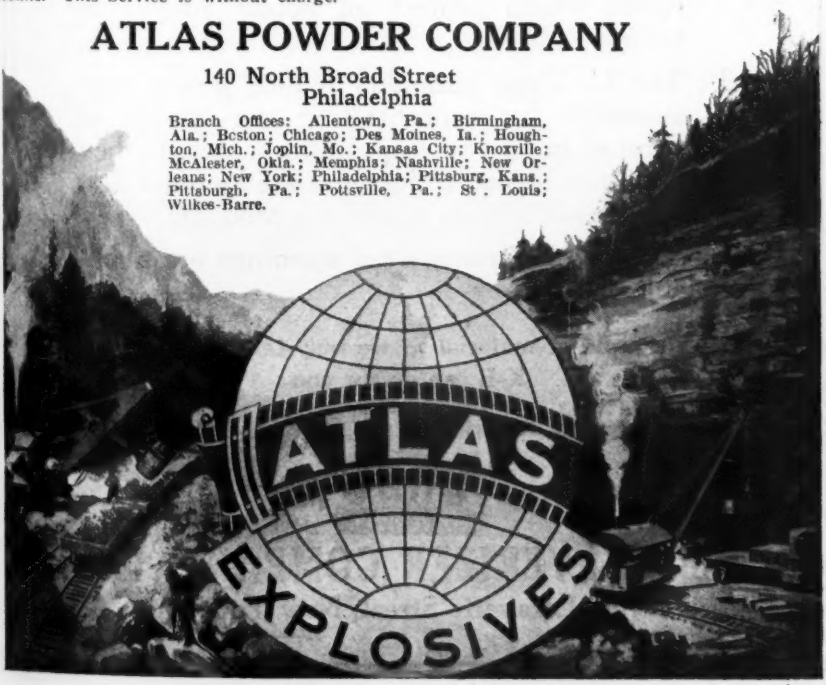
To insure Atlas users getting the best results with the greatest economy of time, labor and money, we maintain the Atlas Service Division. Here is a corps of experts who are thoroughly conversant with the exact properties of every explosive and the most efficient methods of using them.

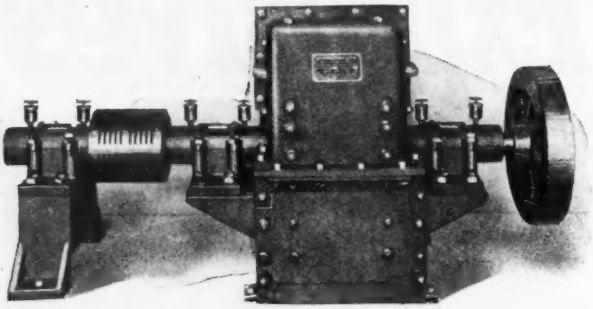
When you are in doubt on any question pertaining to explosives write and explain your troubles to our Service Division. They will give you the correct solution to your problem and, if necessary, will send a specialist to determine just what methods you should use to get the best results. This Service is without charge.

ATLAS POWDER COMPANY

140 North Broad Street
Philadelphia

Branch Offices: Allentown, Pa.; Birmingham, Ala.; Boston; Chicago; Des Moines, Ia.; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Memphis; Nashville; New Orleans; New York; Philadelphia; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.





You want the "K-B" Pulverizer

BECAUSE:

1. It is built entirely of steel.
2. The frame is lined with manganese steel plates which protect all points subject to wear.
3. The U. Type hammers reduce power consumption by concentrating the weight at point of impact with incoming material; they may be adjusted to increase the hammer life, while maintaining a uniform product.
4. Screens of various sized openings are available.

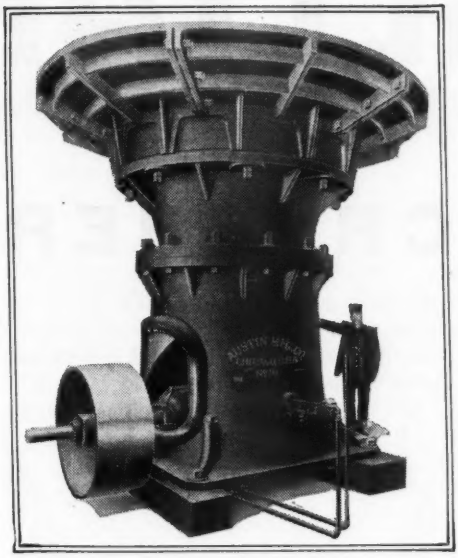
Send sample of material so we may tell you what the K-B can do for you

Complete Equipment for Crushing Plants

Trade K-B PULVERIZER Mark

K-B PULVERIZER COMPANY, Inc.

92 Lafayette Street, New York



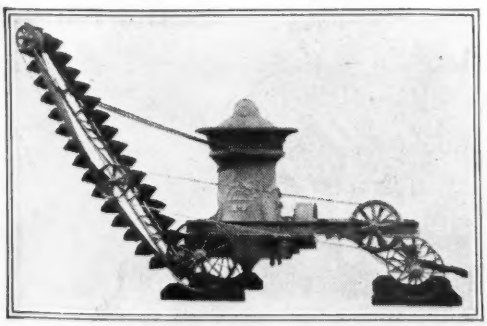
Austin Portable Gyratory Crushers

are the economical solution of many difficulties arising in street, sewer and bridge or building construction; in fact, any job entailing broken stone supply within city limits.

Austin Gyratory Crushers, both fixed and portable types, have been used on such work as

New York Subway and Water Tunnels, and

Chicago city streets to crush old paving blocks and in the water tunnel under Lake Michigan. Their reliable working and excellent construction saved thousands of dollars on these projects of first importance. Made in 8 sizes, 50 to 5,000 tons' daily capacity.



Write for Catalog.

AUSTIN
MFG. CO.
Chicago
New York Office:
50 Church St.

WILLIAMS

2--IN--1 CRUSHER

This machine will take Limestone, Lime, Gravel or Gypsum in cubes 14" x 16" and under, depending on size of crusher, and in one operation reduce same to 2", 1", ¾", ½", ¼", ⅛" or finer. Capacities range from 1½ to 40 tons per hour. Outstanding features are: Low Horse Power, Slow Speed, Small Floor Space, and instant adjustment for any size product desired. Complete information given in

Bulletin No. 85

General Sales Dept.
37 W. Van Buren St.
Chicago

Western Office:
67 Second Street
San Francisco

TELSMITH—

WATCH HIM EAT ROCK

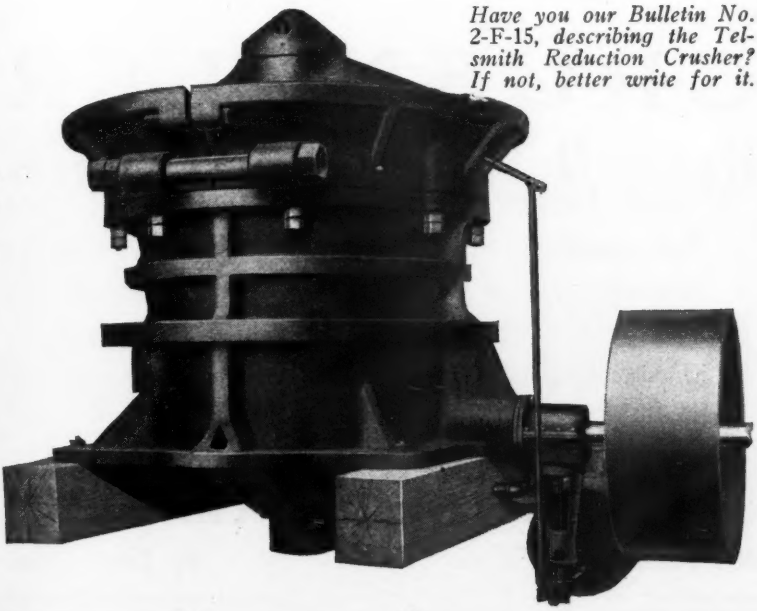
There are more than 500 Telsmith Crushers operating in the United States. Here are a few installations, widely scattered, where interested parties can see the Telsmith Pillar-Shaft Crusher in operation:

Thomasville Stone & Lime Co., Thomasville, Pa.; Charles Warner Co., Wilmington, Del.; Thomas Iron Co., Wharton, N. J.; A. H. Wilcox Co., Chicago, Ill.; St. Joseph Lead Co., Bonne Terre, Mo.; United Railways Co., St. Louis, Mo.; F. W. Woodruff, Louisville, Ky.; Casparis Stone Co., Piqua, Ohio; Liberty Bell Gold Mining Co., Telluride, Colo; York Valley Lime Co., York, Pa.; United Eastern Mining Co., Oatman, Ariz.; Shattuck Arizona Copper Co., Bisbee, Ariz.; A. Guthrie & Co., St. Paul, Minn.; Nelson Storey, Bozeman, Mont.; Barnes King Development Co., Marysville, Mont.; Hilder Granite Co., St. Cloud, Minn; Defrain Sand Co., Philadelphia, Pa.; Chagrin River Sand & Gravel Co., Cleveland, O.; Nashville Railway and Light Co., Nashville, Tenn.; Federal Lead Co., Flat River, Mo.; Elko Prince Mining Co., Midas, Nev. Glad to send you our catalog No. 161.

SMITH ENGINEERING WORKS

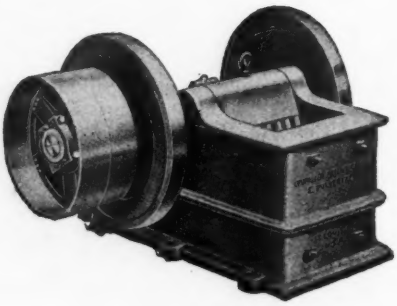
3183 Locust St., Milwaukee, Wis.

Have you our Bulletin No. 2-F-15, describing the Telsmith Reduction Crusher? If not, better write for it.



For Road Building—

You can produce more crushed limestone or other product with less power, in less time, by using a GRUENDLER CRUSHER. They deliver the service—unfailingly—economically—continuously.



GRUENDLER

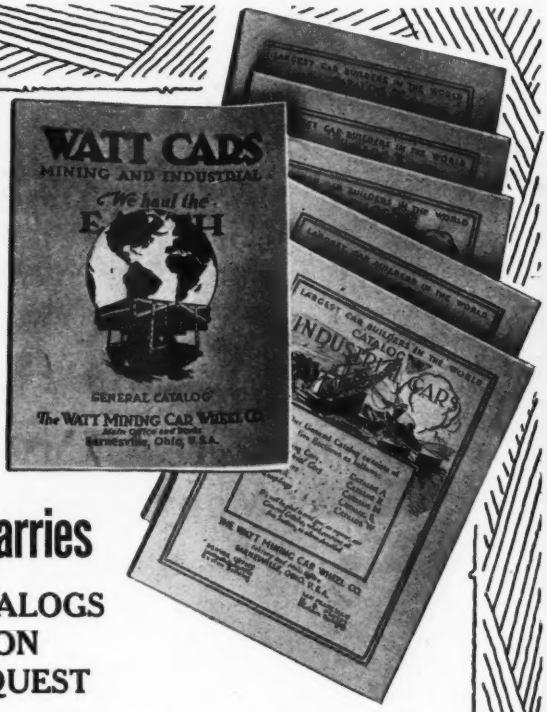
Heavy Duty Jaw Type Crushers

Are simple, rugged, correct in design, give greatest capacity for power required, last indefinitely and are practically free from interruption of operation. Write for illustrated bulletin giving particulars.

Gruendler Patent Crusher & Pulverizer Co.

987 North Main St. **St. Louis, Mo.**

Anything *and* Everything *in* CARS *for* Pits and Quarries



CATALOGS ON REQUEST

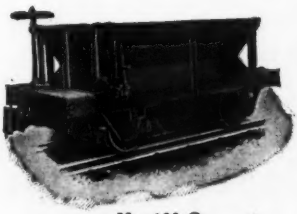
We build haulage cars for all kinds of service and are constantly designing cars to meet special conditions.

We operate one of the largest exclusive plants of the kind in the world.

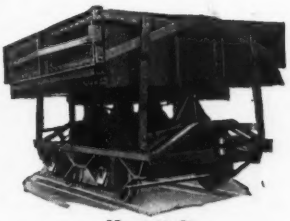
Our products are high grade and well built throughout, the result of 50 years' experience. They last for many years under hard service. Write for catalogs.

The Watt Mining Car Wheel Co.

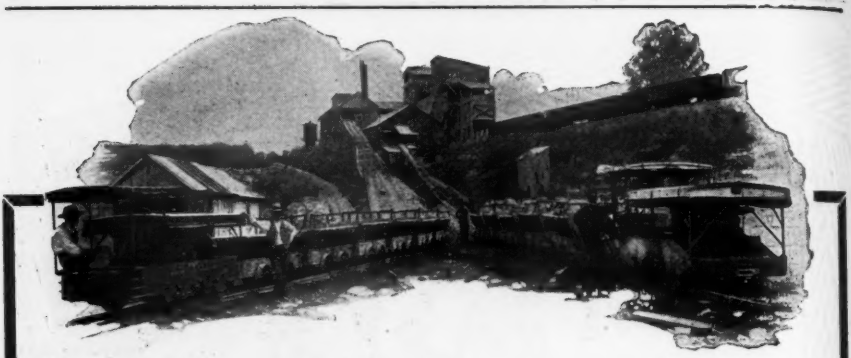
Barnesville, Ohio



No. 129-Q



No. 145-Q



—700 TONS A DAY—

On A Three Thousand Foot Haul—Many Sharp Curves—

At Bucyrus, Ohio, The Brokensword Stone Company have found what a real aid is the PLYMOUTH GASOLINE LOCOMOTIVE. This firm has used the first outfit since 1915, and a second outfit was purchased later.

They handle from 500 to 700 tons per day, using seven gallons of gasoline each, and very little attention necessary to keep them "fit" daily.

And the Owners Say:

"The Plymouth Is the Best Industrial Locomotive on the Market."

Many similar expressions of satisfaction are included in letters from users of Plymouths, who are eager to tell of the advantages gained. These letters show that "Increased Tonnage at Half the Cost" is the result of Plymouth haulage.

WRITE TODAY. Get the facts about the Plymouth. Let our engineers study your problem. They will tell if the Plymouth can help you—And not the slightest obligation.

The Fate-Root-Heath Company

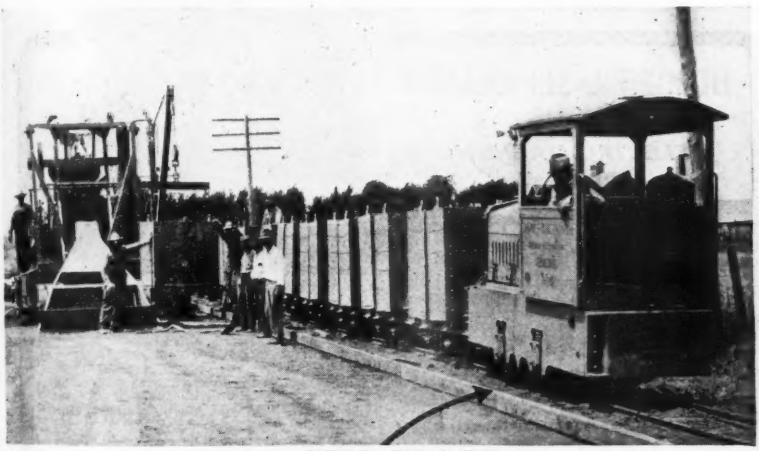
(Successors to The J. D. Fate Co.)

206 Riggs Ave. **Plymouth, Ohio**

Sales Representatives in All Principal Cities

WHITCOMB LOCOMOTIVES

ALL SIZES
FOR ALL CONDITIONS
POSITIVE GEAR AND FRICTION DRIVE
GASOLINE AND STORAGE BATTERY



SIX TON

3-Speed Positive Drive

Road Contractors Special

This Six-Ton Gasoline Locomotive Will High Ball More Material to the Mixer Than Any Other Gasoline Locomotive Built of Its Weight.

Gasoline Locomotives, 2½ to 25 Tons. Storage Battery Locomotives, 2 to 8 Tons on Drivewheels.

GEO. D. WHITCOMB CO.

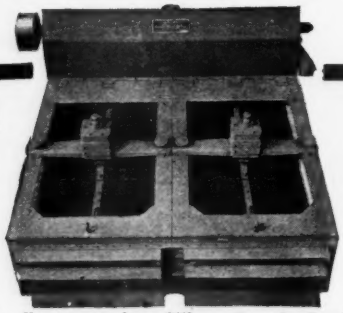
ROCHELLE **ILLINOIS**

"TYLER"

DOUBLE CRIMPED WIRE CLOTH
TON-CAP SCREEN — TESTING SIEVES
TESTING SIEVE SHAKERS
INCLINED VIBRATING SEPARATORS

HUM-MER SEPARATOR

Combines
ELECTRO-MAGNETIC VIBRATION
WITH DRUMHEAD SCREEN TENSION



For screening Silica, Gravel, Sand, Limestone, and all other rock products

In developing the HUM-MER Electrically Vibrated Separator, The W. S. Tyler Company has made a most important contribution to the screening art—one that is making screening more profitable than ever before.

Materials that were considered unscreenable pass through the HUM-MER Screening surfaces freely and in large tonnages.

Electro-Magnetic Vibration

High-speed electro-magnetic vibration is transmitted directly to a taut "drumhead" tension screening surface.

An intense vibration is produced and maintained regardless of the weight of the material passing to the screen; in fact, on the heavier screens a man can stand on the screening surface and not stop the vibration.

Operates at Lower Angle

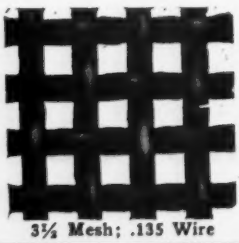
The HUM-MER, due to the intense vibration, can be operated at a lower angle than has ever been possible with inclined screens, with the result that a much better separation can be obtained.

Send Samples for Hum-Mer Test

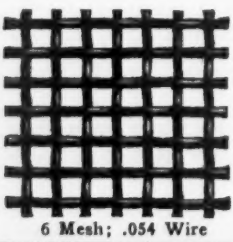
The Company will be pleased to receive samples of material for actual test on the HUM-MER. Fifty pounds of feed and a half pound of the product desired is required for the test. A report of the results as to tonnage and separation and a sample of the HUM-MER product will be forwarded.

THE W. S. TYLER COMPANY
CLEVELAND, OHIO

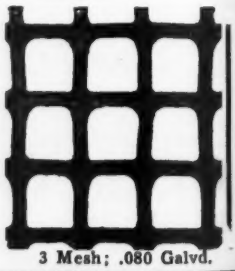
Write Us About Your Wire Cloth Requirements



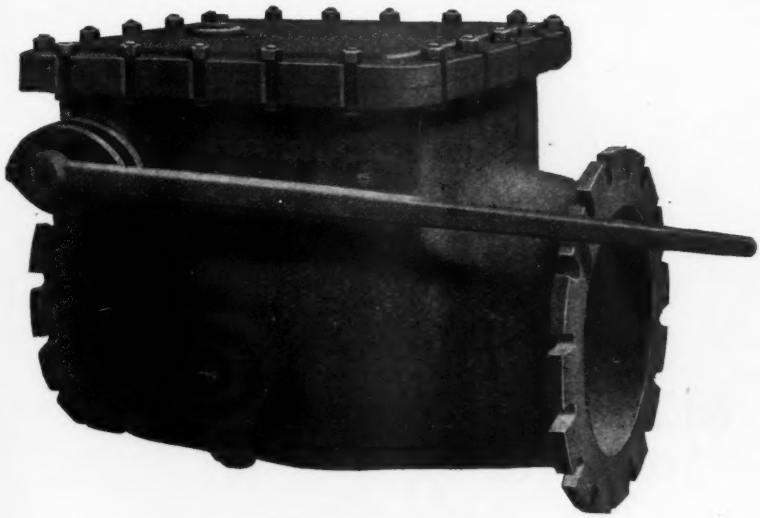
3½ Mesh; .135 Wire



6 Mesh; .054 Wire



3 Mesh; .080 Galvd.



(AMSCO) Flap Valves

are made in sizes ranging from six inches to twenty inches.

Main body housing is made of (AMSCO) Manganese Steel in one piece, with a long, gradual slope toward the discharge end, thus reducing wear and friction to a minimum.

Special top compartment permits the flap to be raised clear of the moving water and gravel, protecting the gasket on the flap.

The cover is easily and quickly removed, due to the slotted flange which holds the cover to the housing.

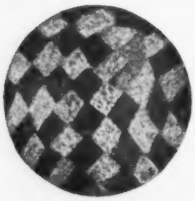
Complete (AMSCO) Pumps of all sizes are also made of Manganese Steel and work in that sturdy and long-lived manner desired by all sand and gravel producers.

Write for Bulletin No. 76

American Manganese Steel Company

General Sales Office: McCormick Building, Chicago

Western Sales Office: Newhouse Bldg., Salt Lake City
San Francisco Office: Insurance Exchange Bldg.
Eastern Sales Office: Hudson Term. Bldg., New York
Foundries: Chicago Heights, Illinois; New Castle, Delaware; Oakland, California



Sections of Two Steam Shovel Chains

WHICH CHAIN WILL SEE THE JOB THROUGH?

ONE is just ordinary chain—without uniformity, spotted with impurities—a hopeless muddle of steel and gray iron.

The other is hand-made "Marion Cable Chain." Note its close knit structure and the dense, uniform appearance of each checkered section. See how compactly the square bars of pure pig iron and the square bars of fine wrought scrap iron and soft steel have been welded and rolled into the finished round bar.

All Marion Chain Is Hand-Made

Tough, fibrous pig, wear-resisting wrought iron and steel, worked patiently by the hands of skilled craftsmen—Marion Cable Chain is tough enough and strong enough for the hardest steam shovel job.

Next time specify "Cable Chain." Find out what real, hand-made chain will do.

The Marion Steam Shovel Company

Established 1884 **Marion, Ohio**

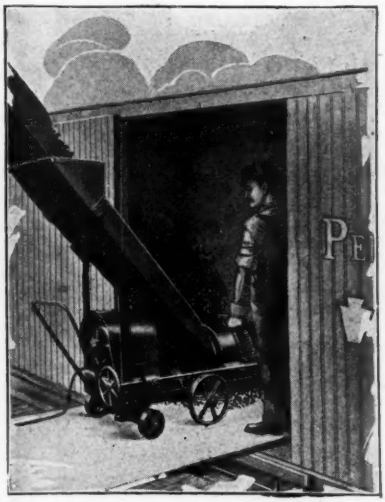
NEW YORK CHICAGO ATLANTA SAN FRANCISCO

Marion

Box Car Loaders

TRADE MARK REGISTERED
FAIRMONT

Steel Ties



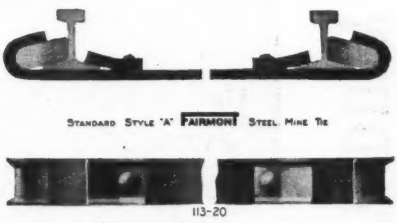
You can load box cars as cheap as open cars with a

"Fairmont" Rotary Box Car Loader

—LET US TELL YOU HOW—

Cut Down the Cost of Your Tracks by Using

Fairmont Steel Ties

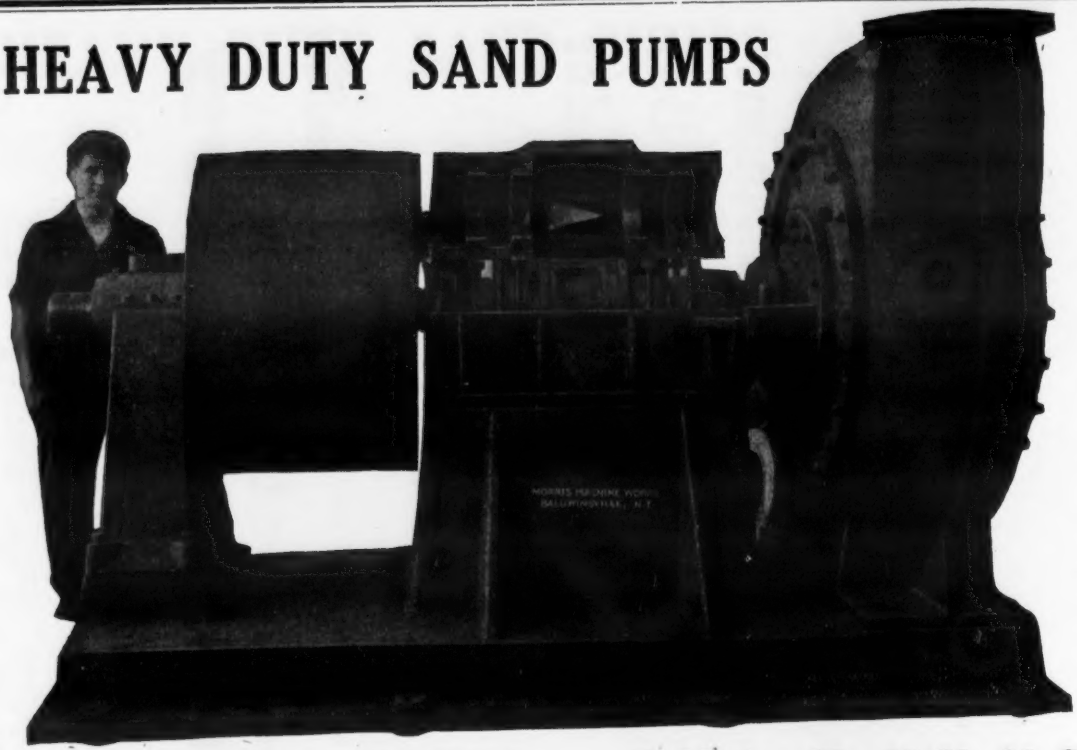


Send for bulletin and prices

Fairmont Mining Machinery Co.

Fairmont, West Va.

HEAVY DUTY SAND PUMPS



MORRIS MACHINE WORKS
Established 1864

Baldwinsville, N. Y., U. S. A.
Branches in Principal Cities

Pit and Quarry

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime
Member Audit Bureau of Circulations

VOL. 4 CHICAGO, ILL., NOVEMBER, 1919 NO. 2

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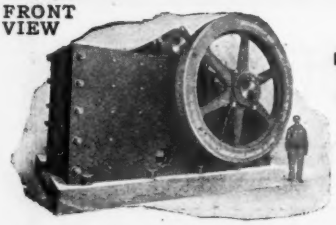
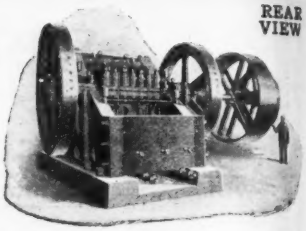
Established 1864
Baldwinsville, N. Y.
Branches in Principal Cities

FRONT VIEW



This
Type "C"
Buchanan
All-Steel
Rock and Ore
Crusher

REAR VIEW



has crushed 3,000,000 tons of hard trap rock, and has never been rebabbided

This type "C" Buchanan, with three million tons of hard trap already to its credit, has never needed any repairs beyond one safety toggle—never even been rebabbided—and has been in practically continuous service for the past four seasons.

The very best open-hearth steel put into the Side Frames, Front and Rear Heads, Pitman Swing Jaw and Toggles, all joints subjected to strain carefully machined, the bearings water jacketed, and a spring balanced parting pitman provided; adjustable jaw stroke; such features as these enable Buchanan All Steel Crushers to perform as outlined above. Twenty-four other crushers having larger and smaller receiving jaws. Write for Bulletin No. 10.

C. G. BUCHANAN COMPANY, INC.

90 West St., New York, U. S. A.

Crushing Rolls, Magnetic Separators, Pulleys and Plants Complete in Every Detail.

BUCHANAN
ALL-STEEL CRUSHERS
every one a profit earner!

Pit and Quarry

Vol. 4 Chicago, Ill., November, 1919 No. 2

"Now I'll put down that convention date!"

This Is a Time of ORGANIZED EFFORT

THE biggest news of the month is perhaps the reorganization of the Lime Association into the National Lime Association, with the changes in its plans and activities as told on another page of this issue. As far as our recollection serves, every move made by this organization has been in the line of progress and for the best interest of the industry which it represents, and we have the faith to believe that this present change will be no exception to the rule. It has not grown out of anything other than a better knowledge of the needs of the industry as developed by the experience of the past years; and with this foundation to build upon, the active services of some of the best lime men as officers, and the hearty support of lime producers in general, it gives promise of outdoing its former accomplishments.

But this is only one instance of what appears to be an increased interest in association work, and an increased appreciation of the possibilities of co-operative effort. The National Agricultural Limestone Association has taken time by the fore-

lock and will hold its annual meeting and dinner this month, getting in well ahead of the other national organizations. But the others are not forgetting that the time of conventions is approaching. Sand and gravel men are already beginning to ask each other if such and such measures cannot be discussed at the Chicago convention in January, while the crushed stone producers are looking forward to some of the things which were promised them as side attractions at the Louisville convention in February, not to mention the weightier matters which they know are sure to come up for solution.

State and local organizations are showing activity also. Secretary Sutton of the National Association of Sand and Gravel Producers has been spending considerable time in the field, getting some of the states into better working condition, but was called away from this to take care of work of more immediate urgency, that of attempting to counteract the order for the allocation of all open-top cars to the coal industry in anticipation of a general strike of miners. Mr. Sutton went to Washington as soon as possible after this order was promulgated, urging upon the Railroad Administration and upon members of Congress the futility of congesting the mines with more cars than the production of coal would warrant. This article is being written at too early a date to report the results of this activity; but it is at least worth while to have shown officialdom that their actions are being watched and that the industries adversely affected by this order are not willing to see their own interests sacrificed merely to rush a lot of cars to points where they will serve no useful purpose.

The various Associations have been extremely helpful throughout the year in watching legislation and departmental rulings and devitalizing adverse ones so far as possible. They have not accomplished all they have hoped to accomplish; but they have at least served as a restraining influence to check too drastic action.

Some of the state associations have been particularly efficient in dealing with the highway problems which have come up under their jurisdiction, and in conjunction with their highway departments they have been useful in developing specifications which have been fair to the producers and economical to the states, while producing roads which were well up to the best highway practice.

All of these activities have served to show to producers the real worth of their organizations. Still greater results are expected from them, so that it is a foregone conclusion that the season's conventions will have more than their usual attendance, and that the members will attend in no perfunctory way, but will go to the convention city with a definite program of results which they will expect to accomplish, either for themselves as individual producers or for the industry as a whole.

If you are not now a member of the state and national organizations which are fighting your battles for you, it is high time for you to join your efforts to theirs and "boost."

New lime works, with a daily capacity of sixty tons, are to be established in Botetourt county, Va., by the Daleville Lime Mari Corporation of Fincastle, Va., and will be in full operatoon by January 1st.

The Western States Cement Company of Independence, Kas., having been partially closed down pending extensive repairs, is again operating on full schedule. The company has adopted a plan of co-operation with the employes designed to prevent misunderstandings and to promote matters of mutual interest. Meetings are held once a week.

Fundamentals in Choosing Plant

By Daniel J. Hauer

ABOUT twenty years ago a quarry was opened up near an eastern city. A small jaw crusher was installed, with the necessary elevator and screens, giving a capacity of about 100 tons a day. Since that time the need for crushed stone has steadily increased until today the local quarries of that city cannot supply the demand, and large quantities of crushed stone are shipped into the city.

During the two decades the quarry has changed hands several times, due to consolidations and combinations of quarries, but today the same man owns it who operated it twenty years ago. During the past year it has been found necessary to rebuild the plant, the crusher having become worthless. Accordingly a new crusher was purchased, also elevator and screens, and the plant put in first-class condition. Nevertheless it cannot be called a first-class plant.

Its capacity is no greater than it was twenty years ago, the same style and size crusher was installed, the same kind and size of elevator, the same style and size of screens. In other words, no improvement has been made in the plant after twenty years except to make it a new one. This in spite of the fact that many improvements have been made in crushers and their accessories, and during this season more than 200 tons of crushed stone per day have been ordered from the quarry, more than half of which business has been refused.

This recital illustrates that there are quarry owners who do not understand the fundamentals in choosing or selecting plant. Naturally in selecting plant one important consideration is the money at hand to be expended. With a few thousand dollars a hundred thousand dollar plant cannot be purchased; but modern management of quarries demands constant expansion in type and size of plant to meet economical operation and the increased demand for the product.

Contrast this case with another quarry within fifty miles of this one, where, after ten or fifteen years of operation, a new plant was installed this year, the crusher being of another type with about four times the capacity, the old crushers being rebuilt to crush up the product from the large crusher. Thus a modern plant has been made out of an obsolete, worn-out one, equal to the sales that can be made, and giving more economical operation.

The writer does not know the business affairs of either of these quarrymen, except in a general way, but it is safe to predict that both quarrymen went into debt for their new plant. One quarryman showed judgment and keen business thought, together with considerable knowledge of modern machinery for quarries. The other man simply repeated what he had done when he was twenty years younger.

Under most conditions the success of a new quarry, or one in which the plant is to be rebuilt, depends upon the selection of the plant. Operation is important, in fact a modern first-class plant can be so poorly managed as to lose money, but not even first-class management can make up losses due to poorly selected and obsolete plant.

The first fundamental in selecting

plant is to possess ample knowledge of modern machinery and tools. The quarry owner or his superintendent may possess such knowledge. If they do, they should use it. If they are uncertain as to their own knowledge, then it is good business to employ an expert in that line, for it is evident that if money is to be expended for plant, the best possible machinery that can be purchased for the money should be installed. This does not mean that the machinery should be such that will stand up to its work with the minimum repairs and upkeep, that is one consideration, but it is just as important that the machinery should be cheaply operated, of the maximum capacity for the smallest investment.

Only recently the writer had to purchase a machine. He obtained prices from more than a dozen reputable manufacturers, the prices varying more than 200 per cent. This shows how it is possible to obtain a machine for a reasonable price that will not only stand up to its work, but may even have double the capacity for the same or less money.

There are always three considerations in purchasing a machine or plant.

The first is the manner of building the machine, the materials used and the design. The design must be such that the machine will work rapidly and be strong enough to stand every strain. The materials must be well selected, and all so built that it is simple to operate and not easy to get out of order. This means the reputation of the manufacturer must be back of his product. If his products are well and extensively advertised, it means that they must stand the test, for worth must be back of advertised goods. A guarantee may mean much or little. A man can swear that his products are good yet he can ignore his promises unless he is responsible and has a reputation to maintain. Such a manufacturer will stand behind his products as well without a guarantee as with one.

The second consideration is the range of work of the machine and its capacity. Naturally these should be the largest possible, as the service given must be based upon these.

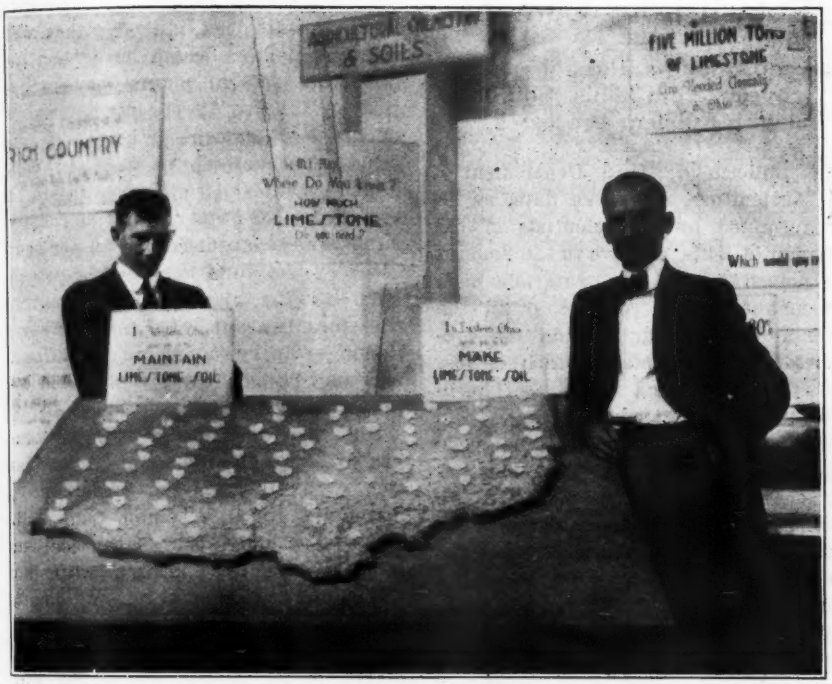
The third consideration is the price. Everyone wishes to purchase the most for the least money, but purchases made entirely upon price, as regards machinery, may mean little, for machinery cannot be sold upon a price per pound, as old metal is sold. The first two considerations must in the end govern the price, even if there is a great variation in the prices of different manufacturers for the same machine. A more expensive machine may be the cheapest in the end. In other words, a good machine, at a high selling price, may quickly pay for itself.

Death of a Pioneer

George W. Johnson, one of the big limestone producers of the United States, died at his home in New Castle, Pa., October 10th.

Mr. Johnson became identified with the limestone industry at an early age and in 1880 bought out some of the interests of Green, Marquis and Company and located in New Castle, the firm being known then as Marquis & Johnson. Some years later he bought out his partner and organized the Pittsburgh Limestone Company, in which his sons were associated with him. His sons continue to operate what is known as The George W. Johnson Limestone Company.

Other industries in which he has been interested are the Lawrence Limestone Company, the New Castle Limestone and Clay Company, the Keystone Limestone Company and the Mahoning Limestone Company. In addition to these, he has been identified with steel, banking and other business interests.



"Agstone" Map of Ohio

Agricultural Limestone in Limelight

Ohio State Fair Exhibit Demonstrates Fertilizer Needs

AGRICULTURAL Limestone came in for considerable attention at the recent Ohio State Fair, one of the most interesting exhibits proving to be that of the Ohio State University, which included the "Agstone" map of Ohio, shown in the accompanying picture, which was taken by *Macadam Service.*

Eastern and Southern Ohio never had limestone soil and Northwestern Ohio though naturally limestone soil has become deficient in this respect, through leaching and drainage. These sections are indicated on the map as are the relative needs of the other sections.

The purpose of the exhibit was to illustrate the importance of limestone to the soil and the fact it was used up by the soil by soil acidity, by growing crops and by leaching.

Placards and posters displayed on the walls gave the following information in regard to limestone:

A limestone country is a rich country. Limestone soils can be made."

"Drainage removes limestone from 200 to 800 pounds per acre per year."

"In western Ohio your job is to maintain limestone soil."

"In eastern Ohio your job is to make limestone soil."

"5,000,000 tons of limestone are needed annually in Ohio."

"Growing crops need limestone."

"Soil acids destroy limestone."

The Agricultural and Commercial Lime Company's plant at Canton, Ohio, was recently destroyed by fire.

Potash from Cement

Large Amounts Possible of Recovery from This Source with Efficient Processes

IN Bulletin 572, U. S. Department of Agriculture, are given data, as determined by the scientists of the Bureau of Soils, relative to the amount of potash in the raw materials used in manufacturing cement, in all the plants of this country, and the proportion of that potash which is lost into the air during the cement burning process. From these data it is evident that if, during a normal year (production about 90,000,000 bbls. of cement), all the cement plants of the country were equipped to recover the dust and fume, the total amount of potash which might be recovered would be nearly 90,000 tons per year, assuming the plants were operated with the usual raw material and under ordinary conditions as to firing, etc.

It has been demonstrated that, if an effort is made in certain localities to substitute higher potash-bearing material in place of the lower potash-bearing rock now being used, a greater amount of potash may be volatilized. A further considerable addition to the amount of potash volatilized may be secured by proper regulation of the temperature of the burning operation and by the addition of a small amount of such material, as salt, fluorite or calcium chloride, which will assist the volatilization of the potash. In fact, it is probably possible to increase by more than 50 per cent the amount of potash volatilized from the cement kilns, if there was sufficient inducement for so doing.

With the Cottrell precipitation apparatus, a commercial recovery of 90 per cent of the potash being lost at certain plants has been obtained. At other plants the recovery has not been so high—being nearer 70 per cent. The available data indicates that wet cleaning devices which have been installed at several plants may be relied on to give 75 per cent recovery of the total potash. Where wet systems of cleaning are used in connection with Cottrell precipitators, a recovery of 85-90 per cent can readily be obtained. Assuming an 80 per cent recovery the total recoverable potash from all the plants of the country, therefore, is about 70,000 tons per year, under ordinary operating conditions, and may be considerably increased by proper procedure as mentioned above.

Not all of this potash is water soluble, or available, due to a recombination with silica or the formation of a complex difficulty soluble compound. However, usually about 90 per cent can be recovered by digestion with hot water, for a period of several hours, or under pressure for a shorter period, so that the total available recoverable potash would be between 60,000 and 65,000 tons per year.

There are now 14 cement plants in the United States at which apparatus has been or is being installed for the recovery of potash from the waste gases from the kilns. With the regular grade of raw material and under regular firing operations there are between 2.0 and 5.0 pounds (averaging about 3.0 pounds) of potash per barrel of cement driven off from the kiln with the gases, at these plants. There are several other plants having direct recovery apparatus but the material recovered contains such a small percentage of potash that these plants are not considered in this discussion.

The total capacity of the 14 plants is about 43,000 barrels of cement daily, and when running to capacity the amount of potash that is volatilized daily is about 100,000 pounds. The recovery apparatus is expected to give an average recovery of about 80 per cent of the volatilized potash, so that with

100 per cent capacity operation, the total yearly capacity might be 15,000 to 16,000 tons. However, the plants are not running to capacity and what is now being recovered is being disposed of only with considerable difficulty. In fact, there has been very little consistent effort to enter this field by the cement companies because of various adverse factors during the last several years. The present production is less than 5,000 tons per year, but it is believed that with an assured price of $2.00 per unit the production would probably be about 8,000 tons per year from present plants.

Many of the plants in the United States do not have sufficient potash in the raw mix to make its recovery profitable, and others for various reasons would not find it advisable to install recovery plants. At about half of the plants in this country, representing about 45 per cent of the total manufacturing capacity, the loss of potash by volatilization under present practice is greater than 2 pounds per barrel of cement. Assuming that only these plants which are losing at the present time 2.0 pounds or more (averaging 2.7 pounds), potash per barrel of cement, should put in recovery plants, the amount of potash which might be recovered without any change in charges or operation would be between 45,000 and 50,000 tons total potash per year, or about 40,000 available potash. By the Cottrell process, this amount could be recovered in a dry product carrying from 7 to 12 per cent total, or 6 to 11 per cent available potash. The actual cost of recovering this material by the Cottrell treaters, at an average plant having a capacity of 3,000 barrels of cement per day, would be about 60 cents per unit K_2O, of which cost 35 cents would cover actual operation, and 25 cents would cover depreciation and intrest on plant.

Even less data is available from which to make estimates as to the cost of recovery, or the efficiency of recovery, with the wet system. From the data at hand it appears that in an installation for a 3,000 barrels capacity plant, the cost of operation, i. e., the cost of removing the potash from the gases and collecting it in the solutions or sludge, including interest on and depreciation of recovery plant, may be between 60 cents and 70 cents per unit of potash recovered.

The dry dust or sludge contains such a small percentage of available water soluble potash that it can be sold only locally. Thus, to market any considerable amount in competition with higher grade salts, the potash must be leached out and converted into a high-grade water soluble salt.

The cost of producing a higher grade product by leaching and filtering the recovered dust or sludge produced in either process, and crystalizing out the potash as sulphate or chloride is estimated to be about 60 cents per unit in addition to the cost of recovering the dust or sludge. Thus, 40,000 tons of potash can probably be recovered in a salt running 40 to 50 per cent K_2O, at a cost of about $1.20 per unit to $1.30 per unit of potash. With royalties, selling costs, storage charges added, the total cost of the high-grade product would be nearly $1.80 per unit. Various economies are possible, such, for example, as the erection and operation of a central leaching plant for a group of plants, which will reduce these costs. Also, at plants where it is necessary, from the dust nuisance prevention standpoint, to recover the dust, some of the cost can be charged against that operation and the potash recovery cost thereby reduced.

Delta Sand & Gravel Company of Memphis, Tenn., capitalized at $50,000, has filed application for a charter. E. C. King, A. M. Bradford, J. A. Simmons, Thos. E. Bell and W. G. King are the incorporators.

Barges Unloaded Quickly This Way

Simple Cableway Keeps Pittsburgh Glass Plant Supplied With Sand

AN efficient equipment for handling sand from river barges to a stock pile 400 feet inshore was recently installed by the Pittsburgh Plate Glass Company at its plant at Charleroi, Pa.

The load of sand is transported over a steel cableway of the length indicated. Figure 1 herewith shows the operating end of the cableway on the shore of the Monongahela River, and Figure 2 shows the delivery end at the plant of the Pittsburgh Plate Glass Company. This cableway is up a considerable incline. The material is handled over the cableway by means of a Blaw single-line clam-shell bucket equipped with suspension bail for use on a Blaw automatic single-rope cableway carriage.

The operation of this system is very simple. Starting from the position shown in Fig. 2, the bucket having just opened and dumped its load near head tower, by paying out slack on the hoisting line, the carriage, with bucket suspended from it, runs down the main cable until it strikes the lower stop, into which it engages, releasing the bucket, which descends until it lands on the sand in the barge. Enough line is then paid out to permit the lower block of the bucket to descend.

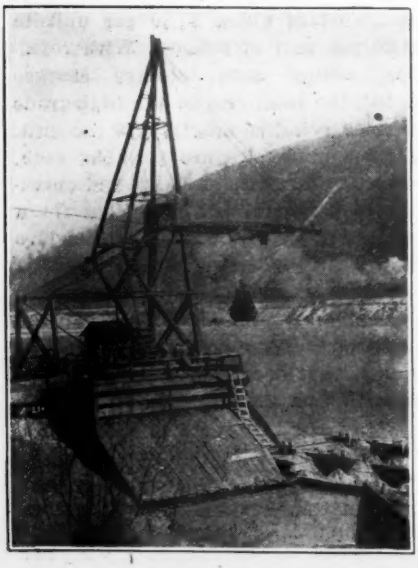


Fig. 1

The man at the hoist then throws in the clutch and commences to hoist. The bucket closes on its load, lifts (on two-part hoist), as shown in Fig. 1, reaches the carriage, locks into it, releases the carriage from the stop, and travels up the cable at the full speed of the hoisting drum, until it is dumped by contact with the tripping stop. A single drum non-reversible 8x12-inch double-cylinder steam hoist is used.

The bucket travels up the cable and back in about 50 seconds. About a minute is consumed in lowering from carriage to the barge, spotting it at the barge, closing, and hoisting about 40 feet to the carriage, a complete round trip conveying about 1½ tons of sand being made in approximately 2 minutes.

In this installation the bucket is never lowered from the carriage except at the lower end, the material being dumped directly from the cableway.

The single-drum non-reversible hoist, in this case, does the same work for which a special three-drum reversible cableway hoist has heretofore been employed; the single hoisting rope, passing over one sheave in the head tower, answers the same purpose as the three ropes (one of them endless), with four sheaves in the head and one sheave in the tail tower, which have hitherto been required for handling clam-shells.

Fig. 2

The carriage moves along the cableway at full speed of hoist, but, due to the two-part reeving through bucket (or fall block) the line-pull, in hoisting load to carriage, is only one-half of the total weight lifted.

The Standard Marble Company of Rome, Ga., has petitioned for a charter, to do a general wholesale and retailing and manufacturing of marble and stone and similar products. The capital stock to be $25,000. C. L. Turner, Loring Rauol and Z. D. Harris are the incorporators.

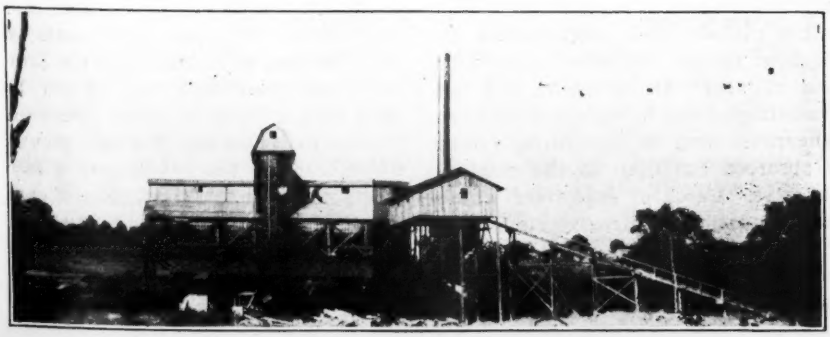
Now Ready to Go

THE Harsh Phosphate Company is just starting its plant at Nashville, Tennessee, for the production of ground phosphate rock and phosphate filler.

"We are now ready to go," writes Mr. H. Harsh to PIT AND QUARRY under date of October 20th, "with the exception of the electric current, which will be cut into our plant in a day or two." Mr. Harsh continues:

"We have an extra heavy kiln-drying cylinder 50 feet in length and 5½ feet in diameter, which is exceedingly well balanced on very heavy trunion bases and trunion rolls; the furnace is built of the very best fire brick; the smoke stack is 89½ feet high, which gives an excellent draft at all times, and our circular bin is 8 feet long, being suspended on iron bars 27 feet long, which gives us a holding capacity of 550 tons. We are located upon the Lebanon branch of the N. C. & St. L. Railroad, with a side track which holds eight cars.

"Our product does not touch wood from the time it leaves the tram cars until it gets in the railroad cars, as all chutes, bins, etc., are lined with sheet iron. We consider our plant complete and up-to-date in every respect. Our grinding will be done by two Williams mills, as we expect to get sufficient fineness with these hammer mills."



Plant of Harsh Phosphate Company, Nashville, Tenn.

Safety Factors in the Use of Explosives in Rock Quarrying

A paper before the National Safety Congress

By DR. WALTER O. SNELLING

Director of Research, Trojan Powder Company, Allentown, Pa.

THE first point at which the quarry superintendent is likely to be concerned with the handling of high explosives, is in unloading the car which brings the material from the manufacturer's plant or magazine. The manner in which the cases are packed in the car is prescribed by the rules of the Interstate Commerce Commission, the method having been carefully worked out with the thought in mind of reducing transportation risks to a minimum, and insuring the consignment of explosives reaching its destination in good condition.

It is quite uncommon to have a car of explosives arrive in damaged condition, but where the contents are found to be damaged, and cases are broken or otherwise in improper condition the matter should be reported to the transportation company, and the condition of the damaged cases should be carefully determined. If there is evidence that the roof of a car has leaked it is always advisable to examine the condition of the cases of explosives under the leak quite carefully. Nitrostarch explosives when very wet become insensitive and difficult to explode, while nitroglycerin explosives under the same conditions tend to "leak" nitroglycerin, and the free nitroglycerin is of course far more dangerous than is the nitroglycerin in absorbed condition in the original explosive. Cases of explosives which show exudation of nitroglycerin should be handled with the most extreme care, and every precaution should be used to avoid any friction, or any jam or blow that might be sufficient to cause an initial explosion which would undoubtedly communicate at once to the entire lot of explosives.

In unloading a car of explosives, just as in handling the cases of explosives in all subsequent operations, care should be taken to avoid unnecessary rough handling. It is true that cases are on record where boxes of dynamite have fallen in quarries for a vertical distance of 100 feet or more without explosion, and it is also true that railroad accidents have occurred in which cars loaded with explosives have been literally torn to pieces without explosion resulting. It is just such facts as these that make it so difficult for the average user of explosives to hold a proper mental conception of a degree of care which should be used in handling explosives, and to draw a clear distinction between that overcautiousness which leads to a general fear of explosives on the one hand, and such careless handling on the other hand as amounts to true foolhardiness.

A case of high explosives need not be handled with quite the same care that would be given to a crate of eggs, nor can it be handled with quite the same roughness that would be used with a block of stone. Between the two extremes lies that safe ground which leads to the handling of a case of explosives with that degree of care which its nature warrants, and yet with the absolute assurance that when handled in this careful way the case of explosives is practically as safe to

handle as any other box of like weight would be.

It is needless to say that the throwing of cases of explosives from a car to a man on the ground is to be condemned, as is also the too rapid passing of cases of explosives through a chute. I have often seen explosives loaded through a chute of considerable length, and once during the unloading of an explosive from a boat I saw a case of explosives broken open by striking another case of explosives which had become stuck at the bottom of the chute. I do not doubt that this sort of handling could be repeated many times without explosion, but nevertheless I feel confident that the operation involves some risk and is therefore to be condemned. The handling of the cases, a few at a time by means of a small truck is decidedly preferable to the use of a chute unless it is quite a short one, and the passing of a case of explosives from one man to another is a great deal better than the throwing of the case, with the possibility of the man failing to make a good catch and dropping the case.

A good deal might be said as to magazines for the storage of explosives. *It is most desirable that a magazine should be water-tight and well ventilated, and in addition should be located sufficiently far from surrounding buildings to offer proper safety. As to the actual type of construction for a magazine, opinions differ widely. The Bureau of Mines advocates magazines made of cement-mortar, and Tech. Paper 18 gives a rather full description with bill of materials for a magazine with a capacity of 20,000 to 30,000 pounds of explosive. At the time the Tech. Paper 18 was published the cost of a magazine of this kind was $400, but the price would, of course, be materially higher at the present time. The walls of the Bureau of Mines magazine are 6 inches thick, and the roof and door, both of which are also of cement-mortar, are 3 inches thick.

The principal advantages of cement mortar of the composition suggested by the Bureau of Mines is that the material is substantially bullet proof, and yet crumbles so readily under a blow such as would be produced by an explosion as to greatly reduce the danger from large flying pieces of material.

Where it is desirable to carry a large stock of high explosives at a quarry, it is preferable to provide a main magazine located at a safe distance from the quarry, and an auxiliary magazine close to the quarry for the day's supply of explosives. The magazine for high explosives should always be located a proper distance from the detonator magazine or storehouse, and it is very important always to bear in mind that detonators and high explosives should never be stored together. In spite of the fact that the storing of detonators with high explosives has been most strongly condemned by government and state bureaus, and by practically all investigators who have studied the matter, one occasionally sees rather clear violations of this simple rule of safety.

The selection of a magazine site, particularly for the main magazine, is a matter to which some thought can profitably be given. It is well recognized that an outcropping rock ledge forms a less desirable location for a magazine than alluvial earth or sand, since in the event of an explosion the earth waves are transmitted to a considerably greater extent through rock, and destructive effects are thus more extended than when a magazine is on a compressible and less rigid foundation.

Where nitroglycerin explosives are being used during cold weather it

is necessary to provide a thaw house in order to insure the explosives reaching the work in proper condition. It is interesting to note that frozen explosives appear less sensitive to a detonator, and more sensitive to ordinary shocks, or blows, than the explosive in its normal condition. This subject has been under investigation for a number of years, and a large amount of information as to the cause of this peculiar phenomenon has been accumulated. At the present time the belief seems to be that although frozen nitroglycerin is relatively much less sensitive than liquid nitroglycerin, yet frozen explosives, in part because of their rigid condition and in part because of the presence within them of crystals of nitroglycerin, are in unfavorable condition to resist friction and forces which tend to distort the form of the cartridges.

The thawing of frozen explosives should always be carried out at a relatively low temperature, and any effort to quicken the thawing action is to be condemned. When only small amounts of explosives have to be thawed, a double jacketed vessel may be used, in which the heating agent is water at a temperature of about 50 degrees C. (122 degrees F.) The temperature should never exceed 55 degrees C. (130 degrees F.)

While explosives are being thawed their sensitiveness seems to be increased somewhat, and accordingly both during the thawing operation and while the explosive is still warm after thawing, exceptional care in handling should be exercised.

Where a considerable amount of explosive has to be thawed, it is best to make provision for thawing at one time the entire amount of explosive used in a day, and for this purpose a special thawing house is necessary. The thawing house should be located at a safe distance from all quarry buildings, and should be provided with some means of indirect heating. Technical Paper 18 of the Bureau of Mines describes a type of thaw house which is recommended by the Bureau, and in which exhaust steam or hot water is utilized as a means of supplying heat, the heating coils being placed in a small shed adjacent to the thaw house proper.

"Make-shift" methods of thawing have led to frequent accidents, and it should always be borne in mind that the thawing of frozen explosives is an operation which should be given careful thought. Where electric current is available it has been the custom in some quarries to place resistance coils or resistance bars in a magazine for the purpose of maintaining a temperature above that at which the explosives freeze, but accidents have been directly traced to this arrangement, and indirect heating, with the heating element placed in an auxiliary fire-proof box connected with the thaw house by a flue or by some other like means, is much to be preferred.

In thawing explosives the use of a high temperature for a short time is much less desirable than a considerably lower temperature for a longer period. Although temperatures as high as 50 degrees C. (122 degrees F.) are sometimes used, a temperature of 40 degrees C. (104 degrees F.) is much to be preferred. The long-continued exposure of explosives in a thaw house should be avoided, and the Bureau of Mines has called attention to the fact that some explosives, such as gelatin dynamites, have been known to decompose and explode after only a few days when continuously heated.

Two methods of simultaneously firing a number of shots in quarrying are available, one method being by the use of electric detonators, and the other by the use of detonating fuse or cordeau.

Cordeau, frequently known as "Cordeau detonant," or "Cordeau Bickford" is lead tubing filled with T. N. T. Experiments have shown that such cordeau explodes at the rate of approximately 5,300 meters per second, and accordingly where a number of holes are connected together by means of lines of cordeau the holes become in effect one single hole.

Electric detonators are copper capsules which contain a detonating charge of fulminate of mercury or equivalent material, and a small loop or "bridge" of very fine wire, which can be heated red hot by the passage of a very small electric current. As the rate at which an electric current travels is stated to be 300,000 kilometers per second (186,000 miles per second), it is evident that where a number of electric detonators are connected to a single source of electric current, their detonation is absolutely simultaneous for all practical purposes.

Both cordeau and electric detonators have their advantages and disadvantages for the simultaneous firing of large blasts. Where a number of widely separate charges are to be simultaneously fired, electric detonators have some advantage over the use of cordeau, while on the other hand cordeau has some advantage in wet holes, and particularly in holes where the explosive charge is interrupted by lengths of stemming for the purpose of "raising" the average height of the charge.

One of the advantages possessed by cordeau is that as the line of cordeau extends the entire length of each hole, the entire column of explosive is brought into detonation at a speed which is determined by the rate of detonation of the cordeau itself. If, for example, a hole 100 feet deep were to be filled with an explosive having a rate of detonation of 3,000 meters per second, and the explosion of its charge to be brought about by an electric detonator placed in the bottom of the hole, the detonating wave would pass through the column of explosive at this rate of 3,000 meters per second. If instead of this arrangement, a line of cordeau extended from the top to the bottom of the hole it is evident that this would communicate detonation to all parts of the explosive in contact with the cordeau at the rate of detonation of the cordeau itself, instead of at the normal rate of detonation of the explosive. The explosive would still probably detonate at its normal rate, but the cordeau would increase the rate at which the column of explosive would detonate through its length. Opinions differ as to the advantages which are gained from this simultaneous detonation of the entire length of a column of relatively slow explosive. For certain special purposes there can be little doubt that it helps bring about a desired "timing" of the explosion of several different types of explosive used in a single blast, and possessing different normal rates of detonation. The use of cordeau as a convenient and safe means of simultaneously firing a number of holes is increasing, and many quarries have replaced the use of electric detonators by this method of firing holes.

(*To be continued*)

The Lidgerwood Mfg. Company of New York announce the opening of a branch office in the Hammond Building, Detroit, Mich., for the sale of their contractors' hoists, derricks and cableways, mine hoists, ship's winches and steering gear, and logging machinery. Mr. R. S. Hutchinson, formerly of the Lidgerwood office in Philadelphia, will have charge of the Detroit office, under the direction of Mr. F. B. Knight of the Lidgerwood Chicago office, who previously handled this business in Detroit.

Important Statement By Hines

Railroads to Be Transferred to Former Management at End of Year

WHEN Director-General Hines was in Chicago about the middle of October he was questioned by a good many shippers in regard to the return of the railroads to their owners, and made the following statement:

"There has been no qualification whatever of the President's announcement made in his message to Congress last May, that the railroads will be handed back to their owners at the end of this calendar year. The Railroad Administration is making all its plans to this effect with a view of making the transfer back to private management at that date with the least possible disturbance of the public service. To this end we are cooperating actively in every practicable way with the representatives of the railroad companies.

"The question has at times been raised as to whether, when the railroads are turned back on December 31, they will be in proper physical condition. This involves the question as to the maintenance of the railroads during federal control, and that subject has had most careful attention on the part of the Central and Regional Administrations, as well as on the part of the organizations of the federal managers.

"My judgment is that at December 31 the physical condition of the properties will compare favorably with the condition when the properties were taken over on December 31, 1917, and this is what the government's obligation contemplates. On some particular railroad it may turn out that less maintenance of a particular sort has been done, this being due to inability to get materials during the war period; but I believe that, broadly speaking, this will be offset, or more than offset, by maintenance of other character which has been done, so that it is a fair general statement to say that the government will turn back the railroads in a condition required by the contract, although in specific instances there may have to be readjustments, some involving payments to the government and some involving payments by the government. It may be that on a balancing of all these matters which are capable of settlement the government may have to make some net outlay in cash, but the amount will at most be a very small proportion of the amounts expended for maintenance. On the other hand, it may turn out that the cash balance will be in favor of the government."

Reduction In Rates On Glass Sand

Can Go at Lower Charge From Ohio to West Virginia, as Result of Recent Ruling

An order requiring the carriers to reduce their rates on glass sand from Silica, O., to Fairmont and Clarksburg, W. Va., on or before December 15, has been made by the Interstate Commerce Commission. The rate to be established must not exceed $1.70 per ton, plus 15 per cent, plus 20 cents.

The complainant's shipments, in this case, were made from Silica, a point on the Toledo, Angola & Western, about 8.3 miles outside the Toledo switching district. Rates ranging from $2 to $3.30 per ton were in effect during the period of movement, which was from July 2, 1917, to March 27,

1918, both inclusive, the rate depending upon the route over which the sand moved. The complainant averred that it was not able to use the $2 rate, applicable over the Toledo & Ohio Central and its connections, because of the difficulty of obtaining cars for loading via that route. A large majority of the shipments moved over the New York Central from Toledo to Sandusky, thence over the Baltimore & Ohio, at a rate of $2.10. On account of an embargo against the usual route, some sand was shipped over the Baltimore & Ohio from Toledo, at a rate of $3.15, composed of the class rate of $3.10 from Toledo, plus 5 cents, the balance of the non-absorbed rate of 20 cents exacted by the Toledo, Angola & Western to Toledo. The complaint was aimed chiefly at the Baltimore & Ohio.

Multiplying Capacity of Linwood Plant

Davenport Company Getting Ready to Produce 2,000 Tons of Crushed Stone per Day

THE Linwood Stone & Cement Company, owner of land and quarries near Davenport, Iowa, containing rich deposits of limestone, is spending between $100,000 and $125,000 on a new plant which will increase the company's daily average output from 400 tons of crushed rock to 1,800 or 2,000 tons, exclusive of considerable riprapping material.. The work is now practically completed.

New and heavier machinery is being installed, larger steam shovels set up and the entire plant electrified. Thew and Bucyrus 70-ton shovels are included in the equipment.

The plant when completed will not be the largest, General Manager Schroeder said, but he believes it will be the finest arranged of any. A building committee representing directors of the company visited a number of quarries and stone crushing plants in the country before working out plans for the new plant.

The Linwood Stone & Cement Company, was re-organized on February 1, and the capital stock increased from $75,000 to $250,000, all of which is paid up.

Following the reorganization the company acquired control of additional property.

After extending the confines of the old quarry the company voted on a plan of expansion entailing the erection of an entire new plant, purchase of larger machinery and other improvements necessary to bring the output on a plane with the anticipated demand for crushed rock.

When the company was reorganized J W Crowley was retained as president; A. E. Horst, vice-president; and J. F. Schroeder became secretary-treasurer and general manager. The following are directors: J. W. Crowley, A. E. Horst, J F Schroeder, A. E. Carroll, D. E. Keeler, Otto Hill, A. C. Klindt, Dr. Neufield and R. J. Walsh.

A large number of tests were completed on the material quarried by the engineer in charge at Ames, Iowa, Agricultural College. Mr. Myers the assistant engineer for the Iowa State Highway Commission, also inspected the plant and materials on the ground and secured a number of samples. Crushing test on concrete scored from 40 to 50 per cent above the standard required, and the French co-efficient showed a test of 40 per cent above standard required.

Jason Henry Shepard, who died in Evanston, Ill., on October 6th, had been engaged in the paving and contracting business in Chicago for many years. He formed the firm of Dolese & Shepard in 1868, continuing in business until 1897. He was 81 years old.

Extricating a Man Caught in a Slide of Rock

Ignorance Is Costly

Accidents Can Be Prevented by Proper Care—Ask the Red Cross for Help

DURING the year 1916, among 90,979 men employed in the quarries of the United States, 173 were killed outright and 13,427 were injured. The total number of killed and injured was 15 per cent of the number employed.

A realization of the fact that much loss of life, much suffering and the want consequent upon it, could be prevented by thorough training of employees in the simple principles of first aid, has led many mines and railroads and factories to offer the Red Cross First Aid courses to their men, and in several states legislation has been enacted to provide for instruction in industrial plants. During the past eight years a half million railroad employees have taken the course, and the wide experience of the Red Cross has demonstrated that the accident rate among men who have had instruction in first aid and accident prevention is 75 per cent less than among the uninstructed.

It is the treatment a man receives during the first fifteen minutes that is important. And it is very easy to do the wrong thing—to wash out a wound with water and bind it up when it should be left alone, to prop up a man suffering from shock when he should be laid out flat. A little knowledge may be dangerous, but it is not half so dangerous as no knowledge at all. To do the right thing and to do it quickly may save the man's life—certainly will shorten the time during which he is laid up and unable to work. And such a realization of the effects of accidents as he gains from a first aid course is bound to make a man more careful.

The American Red Cross maintains a staff of field representatives, trained in first aid and accident prevention work, who are loaned to railroads, quarries, mines and similar industries for the purpose of instructing employees. It will assist any club, so-

ciety or group of individuals anywhere to start a class, and desires by every means in its power to promote a knowledge that will save from disaster as many as possible of the 100,000 bereft families, the 500,000 cripples, who pay the price of ignorance every year in the United States.

Monthly Colors for Cost Keeping

IN an article published in the February issue for 1919, a method never before published was given, showing how to keep a record of the stripping of a quarry, as well as of the yardage or tonnage excavated.

In that article it was pointed out that by a rough survey and with certain lines marked upon a map and profiles, a record can be kept of the progress of the excavation.

This map and the profile can be made to tell the story of the progress in a more graphic manner by the use of water colors. With a small camel's hair brush the colors are marked upon the profile, a different color being used for each month. In selecting these colors the one for each succeeding month must contrast strikingly with that of the preceding month, so that colors that come one after the other will not be so near alike as not to be distinguished easily and quickly.

The following list of colors has been tried out and used extensively to denote monthly progress upon maps and profiles:

January	Carmine
February	Light Blue
March	Orange
April	Green
May	White
June	Lemon Yellow
July	Vermillion
August	Navy Blue
September	Gray
October	Pink
November	Burnt Sienna
December	Black

These colors are not a necessity nor are they an aid to cost keeping, but they do assist the busy quarry operator in quickly telling the approximate amount of work done during each month.

For practical and accurate cost keeping there must be the measuring up of the quarry ledge. This is done in the manner as described in the previous article referred to; the measurements taking in the stripping, drilling, blasting, and picking up of the excavated material.

For the measurements for operating a crusher plant the cubic yards can be figured out monthly from the colored profile and map, but the most common method is that of weighing the stone just before it is fed to the crusher. In some quarries the stone is also weighed in wagon or trucks after being crushed and before deliv ery, while crushed stone delivered by railroad is generally weighed in the cars.

It is by these methods and records that cost keeping is made valuable, allowing unit production costs to be figured instead of only amassing daily records of costs that amount to little more than a general pay roll, after the records are a few days or a week old. Measurements and weights should be the basis of all cost keeping in quarries.

The Indiana Portland Cement Company's new million dollar plant at Greencastle, Ind., which has been in course of construction for the past two years, has started active operations. The plant is one of the largest in the world, having a capacity of 1,500 barrels daily, which will be doubled within the next year. It is electrically driven and has a kiln 240 feet long, kiln stack standing 210 feet high, which it required 14 flat cars to transport to this place.

How Talc Is Mined and Milled in Vermont

From a Bulletin of the Bureau of Mines
BY RAYMOND B. LADOO, Mineral Technologist

THE Eastern Talc Company, the largest talc producing company in Vermont, operates a mine and a mill at East Granville, and three mines and a double mill near Rochester. The three mines which supply the Rochester mills are located about 4½ miles north of the mills. Mines Number 2 and Number 5 have been operated for many years. Each was opened by a small shaft which followed down the walls of the talc body. A new mine, Number 8, has just been opened on a lens recently discovered by diamond drilling. Originally only pure talc was removed, and as the talc veins were usually less than 15 feet in thickness, the method of overhand stoping from stulls was used.

When it was discovered that the grit core between the talc veins could be used successfully, a very large amount of material was made available in the old mines, and a new system of mining was developed. All of the mines are opened on a series of talc lenses strung out in a line running roughly north and south, the axis of each lens being practically parallel to the direction of schistosity of the rocks. The lenses vary in thickness from 18 feet to 60 feet or more. The largest lenses are over 400 feet long and have been opened to a depth of over 450 feet although the bodies seem to grow thinner below 300 feet from the surface. As the older deposits neared exhaustion, a vigorous plan of development was undertaken both by diamond drilling and by sinking, drifting and crosscutting. The diamond drilling has been particularly successfull for by this method large reserves, over 2,800,000 tons, have been blocked out. The largest body yet discovered, that opened by the new Number 8 shaft, had very little visible outcrop and was proved up by drilling. As the Number 8 mine embodies all of the best features of the older mines, it alone will be described.

A shaft was sunk, starting in the black wall, and going down along the strike at a dip of 45 degrees. At the surface the shaft is timbered with round timber and lagged tight with round poles but after the solid rock was struck, no timber was used. The shaft is divided into two compartments with a manway at the left and a skipway at the right. At a depth of less than 100 feet, talc was encountered and the remainder of the shaft is in talc. The solid rock section of the shaft is cut 15 to 20 feet square.

Since the ore bodies here, as everywhere in Vermont, are very irregular in size, shape and dip, it is very difficult to devise a standard mining method. Both the talc and the walls stand exceptionally well so that practically no timber is needed for support. Some water is encountered but pumping is not a vital problem. Both the talc and the grit are drilled easily and break well.

In the old mines, the level interval was more or less irregular, but in the Number 8 mine the interval will be 175 to 200 feet. At a given level, cross cuts are run each way from the shaft to the limits of the body as defined by the "black wall." Then drifts are run from the ends of the cross cuts in each direction following the walls to the limits of the body. Raises are put up frequently, but at irregular intervals,

at an angle of 45 degrees with the horizontal, from both the drifts and cross cuts to the walls. These raises usually branch and go to opposite walls at angles of 45 degrees from the horizontal. The tops of adjacent raises are often connected. All the openings are cut large, 10 to 15 feet or more square, and are not timbered. When the body or portions of it farthest from the shaft are completely developed by such openings stoping is begun.

Talc above the tops of the raises is removed by overhand stoping. Such stoping may cut through to the level above or a back pillar may be left. Great care is taken before leaving the back to insure safety, as the back, once left, is inaccessible. Stoping is then continued by underhand slicing or benching into the raises. The talc is thus worked out retreating toward the shaft, milling the ore into raises and leaving large open stopes, often 50 feet wide, 150 feet long, and 100 to 250 feet high. As much "black wall" and "cinder" as possible is left as pillars. In high stopes the directions of the raises are frequently changed to slow up the fall of large pieces of ore.

In shooting down the ore, it is considered good practice to break out large pieces in order to avoid fines, for fines become saturated with water and must be dried at the mill. This necessitates much secondary blasting and hand breaking.

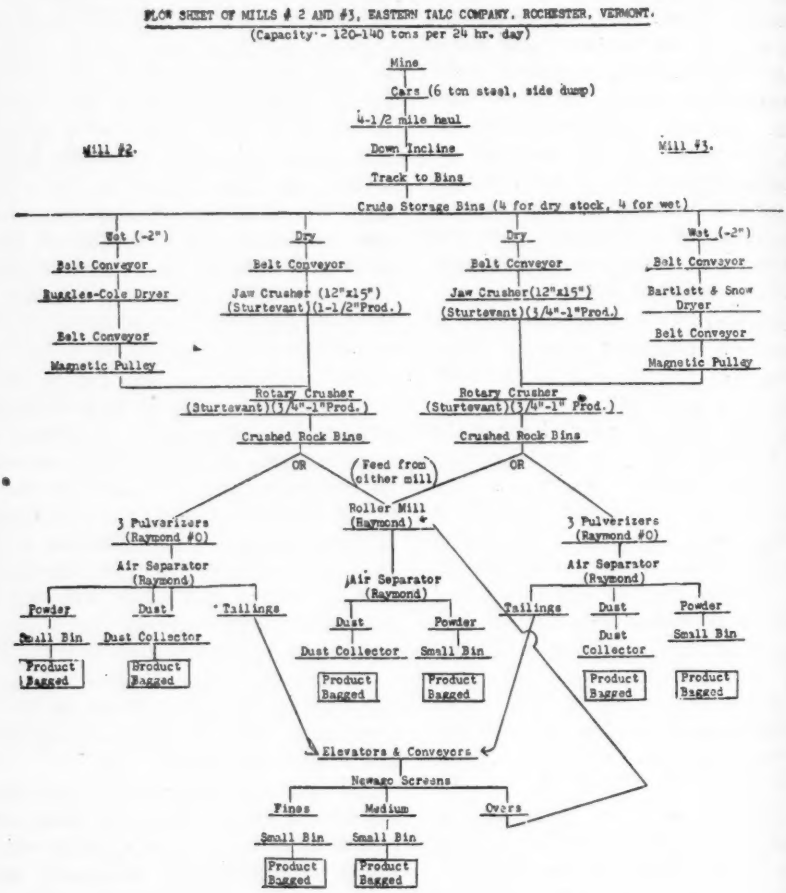
At the foot of the raises no chutes are used, but the rock is shoveled into small, wooden cars of 18-inch gauge. These are trammed by hand to the shaft and dumped into a rock bin at the bottom of which is a measuring pocket with a counterbalanced tip-up spout. At the surface, the talc is dumped automatically into a chute and over a 2-inch grizzley set at a flat angle. Here the waste is picked out, and thrown into a waste chute and the pure talc (as distinct from the "grit" talc) is thrown into a talc bin. The fines go to the wet bins and the oversize grit talc to the dry talc bins.

From the bins, the talc is drawn off into six-ton, steel V-shaped, rocker dump, 36-inch gauge cars, and hauled in trains of 6 to 8 cars by a saddle tank steam locomotive about 4½ miles to the top of an incline at the mill. The cars, at the incline, are, one at a time, run on to an incline truck and lowered by gravity to a track at the top of the mill. From here, they are trammed by hand over a short track and dumped into the proper mill bins.

The milling of the talc can be best understood by a study of the flow sheet. Mills Number 2 and 3 are so arranged that they can be run together making the same product, or separately making different products. When making different products, Mill Number 2 is usually reserved for grinding the finer grades of pure talc. The two principal products made are the coarse sizes from 20 to 100 mesh, used principally in the roofing industry, and the fine sizes, 200 mesh with varying oversize tolerances, used in the paper, paint, and rubber industries.

The mill has been run entirely by steam, but electric drive is being installed and is now practically completed. An important feature in the new electric installation is that of individual motors for each of the most important machines, each connected to a circuit breaker and ammeter on a separate panel in the engine room. In this way, the power being used by each machine can be watched and checked continually. The check on the power consumption of each machine not only affords a means for comparing efficiency of various machines, but enables an estimate to be made of the cost of producing different grades of talc.

The mine at East Granville has been operated for many years, being originally worked as an open quarry. Now it is being worked underground from an adit about 1,000 feet long, en-



tering the body along the strike about 200 feet below the surface at the deepest part. The deposit is really a series of lenses, more or less in line, varying in width from 15 to 50 feet and in length from 50 to 400 feet, sometimes adjoining, and sometimes separated by distances up to 150 feet. The general field relationships are similar to those at Rochester and elsewhere in Vermont except that the walls do not stand as well as at Rochester. Production is comparatively small and little development work is being done except some diamond drilling both from underground and from the surface. The mining method is similar to that used at Rochester and need not be described.

The ore from the mine is trammed in small mine cars and dumped into a bin holding 7 to 8 tons at the head of an aerial tramway leading down to the mill. This tramway is 1,400 feet long, and is equipped with two buckets, the load, going down by gravity, pulling the empty to the top.

At the mill, the rock is dumped on the floor of the crusher room and forked to separate out the wet fines. The wet material is taken in wheelbarrows and dumped upon a sheet iron drying floor heated by coils of steam pipe beneath. After it is dry, it is

fed with the coarse dry talc into a 12-inch by 15-inch Dodge type jaw crusher which makes a 1-inch to 1½-inch product. This is further reduced to ½-inch by 12-inch by 12-inch Sturtevant rolls and then fed either to a Raymond 4 roller mill or to a 36-inch Sturtevant vertical emery mill. The product from each mill is separated by the Raymond system of air separation into a finished product and tailings. The tailings are separated by Newaygo screens into two finished grades and tailings which are returned to be reground. The capacity of this mill is 50 tons per 10-hour day. Approximately the same grades of products are made here as at Rochester.

Extra! Extra!

Car Order Repealed! Pit and Quarry Operators Can Now Get Cars Without Discrimination

THIS page is broken open at the last moment on October 29 to state that an order has just come through, effective this date, rescinding the former order giving all open-top cars to the coal mines.

These will now be allotted to pit and quarry operators, and others using this class of carrier, without discrimination.

Chains and Buckets

The Howe Chain Company of Muskegon, Michigan, has just issued Catalogue No. 100 which it is anxious to get into the hands of chain users in our field. This catalogue shows a number of different types of chains for carrying bucket elevators and for other purposes, and will be found of interest as helping the operator to determine the kind of chains fitted to his service. In connection with the chains, six different types of malleable iron elevator buckets are also shown.

Minnehaha Rock in Big Demand

Quarries Unable to Supply Needs in Road Building and Construction Work

DEMAND for crushed stone is increasing at an enormous rate and with present facilities it is impossible to supply it, says a dispatch from Sioux Falls, S. D. Recently the east quarry at East Sioux Falls was reopened and the lessee has also secured that at Rowena, a few miles to the east of the Illinois Central railroad. It is understood that the entire output of these two quarries has already been contracted for shipment to Omaha.

According to E. J. Berdahl of Garretson, the organization of one or more companies for the purpose of erecting stone crushing plants at that place is now under consideration and within a short time they expect to let contracts for the necessary machinery so as to have the plants completed and ready for operation before next spring.

Within the past three weeks representatives of Chicago firms have been looking over the Jasper granite deposits in the vicinity of Garretson and the northwest part of Rock County, Minnesota, with the intention of locating a number of plants, which have in view the supplying of road building material in Illinois and other sections.

At the present time the output of the crushers at Jasper, Minnesota, and Granite, Iowa, is being taken for the road building projects in the state of Iowa according to a letter recently received in Sioux Falls from the state highway commissioner at Des Moines, who also says "that these plants are unable to supply the requisite amount to meet daily needs of contractors already at work," and that by the time work opens next spring the present demand will be doubled many times

Soil Tester Is Produced Commercially

Mr. Whipple's Device Has Been Perfected and is Being Marketed by a Washington Firm

THE simple method for measuring the need for lime in sour soil, originated by Mr. A. D. Whipple of the National Lime Association and demonstrated by him at the Pittsburgh convention, has now been developed to the point of commercial practicability and is being marketed by a Washington firm under the name of the Trufast test for sour soil.

"I believe this outfit is of special concern to all persons interested in the use of lime on the soil, namely, to the farmer who must pay for the lime; to the investigator and all that other large group of men who advise the farmer on such points; and to the manufacturers who will sell the lime materials," says Mr. E. O. Fippin, director of the Agricultural Bureau.

"The farmer who might use lime on his soil wishes to know how much lime to apply to get good crops and still keep the expense as low as possible. This depends on the degree of acidity in the soil and upon the sensativeness to sour soil of the crops the farmer is growing.

"Any simple and rapid method that will determine this need, even approximately, seems likely to be welcomed by all persons concerned.

"Some of the recognized methods for detecting sour soils, such as the litmus paper test, do not measure the extent of that need. Other tests that do attempt to measure the extent of the need of lime are so complicated that they are not applicable to use in the field.

"The Trufast test shows graphically and directly the number of tons and parts of tons of lime required by the soil. Moreover, in many of the laboratory methods, there are certain details to which some investigators of the use of lime make serious objection.

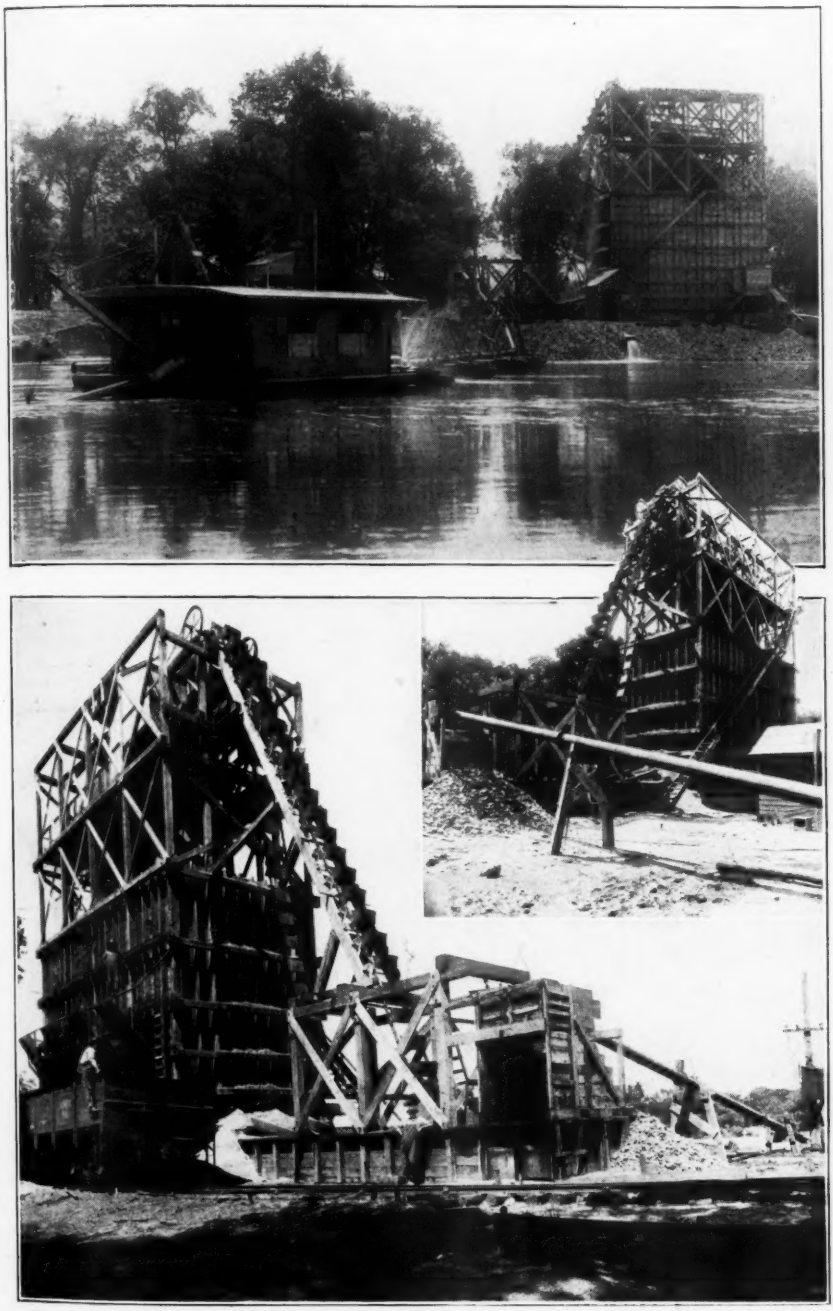
"In the rapid and simple method devised by Mr. Whipple to measure the need for lime, I believe there has been eliminated the basis for most of those objections and that he has produced an outfit that will meet the test of practical field use by the man of average intelligence—the farmer, the county agent and the salesman of agricultural lime—and at the same time, it is as accurate and as sound in principle as the best of the strictly laboratory methods. It operates on the same principles as the best of those methods."

Taking Sand from Cedar River

THE illustrations on the opposite page show the plant of the Cedar River Sand and Material Company. This concern has its office in Waterloo, Ia., the plant being about five miles below that city on Cedar River. The plant has been in successful operation for the past few years, producing up to 20 cars per day.

The initial piece of equipment is a 10-inch standard sand pump of the Morris type, by which the sand is taken from Cedar River. The screening, washing and conveying machinery was furnished by the Good Roads Machinery Company. The plant is electrically driven, using a 150-horsepower General Electric motor for the sand pump, 35-horsepower for elevators and screens, and 25-horsepower to operate the 6-inch pump which supplies water.

Two grades of sand are produced, plastering and ordinary torpedo; also three sizes of gravel, and a graded mix for concrete aggregate. The oversize is sold for riprap.



Plant of Cedar River Sand and Materials Co., Waterloo, Iowa

A new Screen revolutionize p

The Mitchell Electric Vibrating Screen is the invention of B. A[uses] Mitchell, chief mechanical engineer of the Utah Copper Company. After two years' successful operation in one of the world's large[he Mi] concentrating mills, it has been developed to the highest degree o[r gran] efficiency ever attained by a screening device. [ell ad]

The Electric Vibrating Unit, the distinguishing characteristic of th[uarry] Mitchell, is designed on principles which, as applied to screeni[he Mi] are revolutionary. **It forces the meshes up into the material 3,60[ne ins] times a minute with an impact of 500 to 1,000 pounds. The mov[pproxi] ment of the meshes of the screen is in a minute, circular path a[ith onl]**

Write us for the illustrate[klet d]

MITCHE[L]

ELECTRIC

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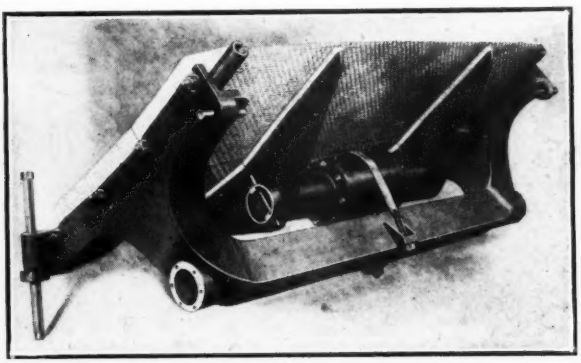
VIBRATING ELECTRICALLY that will pur screening

auses not the slightest jarring or straining of the mechanism.

he Mitchell can be used for the classification of any crystalline r granular material, coarse or fine, wet or dry. It is particularly ell adapted to the screening of sand, gravel and other pit and uarry products.

he Mitchell is extraordinarily economical in power consumption. ne installation of 8 screens is delivering a screened product of pproximately 12,000 tons per 24 hours of minus ½" material ith only 3 H. P.

let describing the Mitchell



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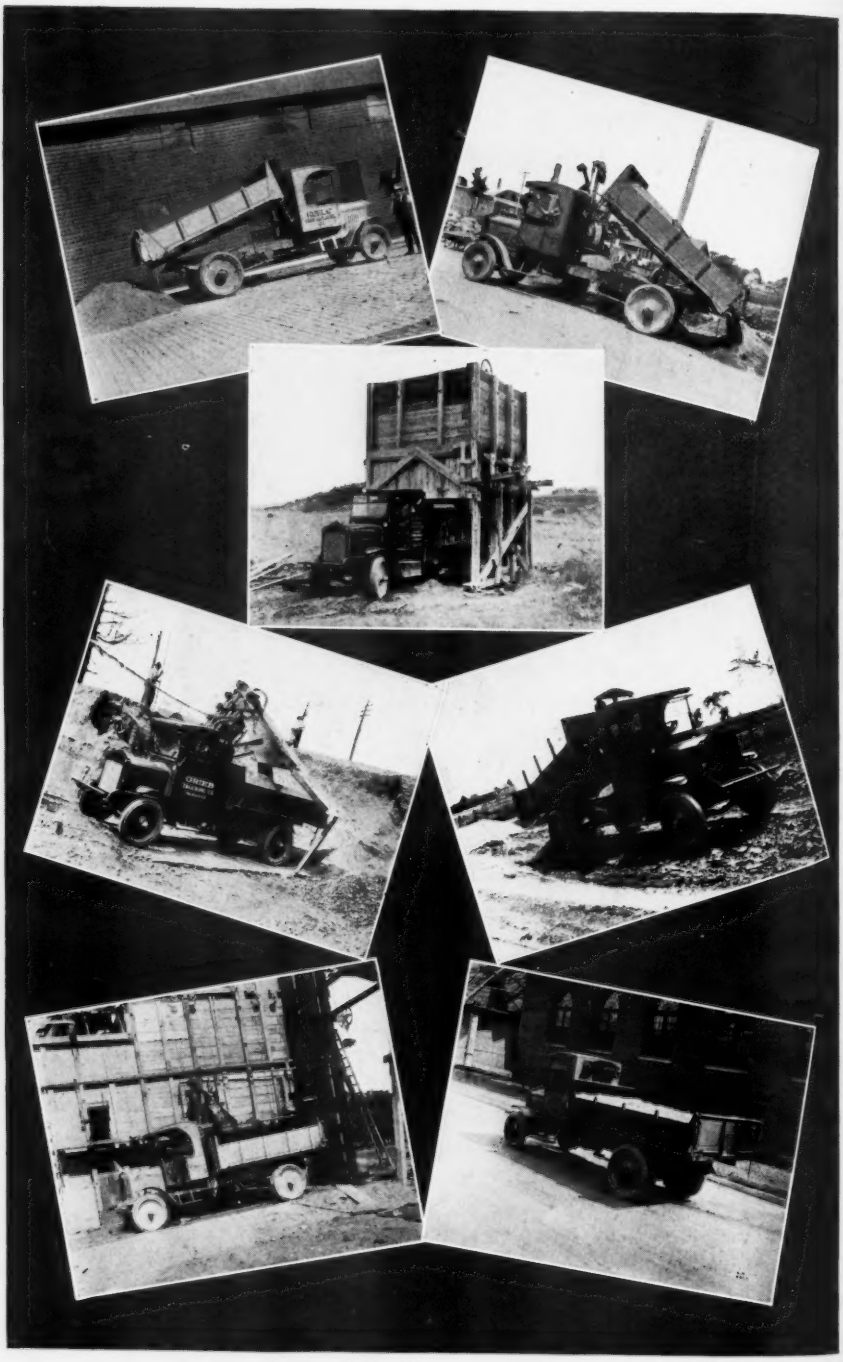


Making Deliveries by Motor Trucks in Milwaukee

Motor Truck Delivery in Milwaukee

Most Products of Pit, Quarry and Mill Are Carried This Way to the Ultimate Consumer

MILWAUKEE is probably more completely "motorized," so far as the delivery of pit, quarry and mill products is concerned, than any other city of the country.

One reason for this may be found in the fact that Milwaukee is a truck manufacturing center.

The illustration on the opposite page shows trucks owned by a number of different operators in that city, all in the service of hauling sand, gravel and stone. The firms represented in this group are:

Nehls Sand & Gravel Company,
Holland Trucking Company,
Milwaukee General Const. Co.,
E. A. Reese,
Grieb Trucking Company,
K-R Trucking Company.

The trucks shown are all made in Milwaukee by the Titan Truck Company. The 5 to 6-ton truck seems to be the popular size in that city for handling these materials.

Plans of Crushing Plants

A bulletin which will be of interest to crushed stone producers is Bulletin 1411 of the Allis-Chalmers Manufacturing Company of Milwaukee, which has proven so popular that several reprints have been made necessary. This is entitled "Modern Rock Crushing Plants," and in addition to giving considerable information on the equipment for such plants, a number of pages are devoted to plans of rock crushing plants of various sizes. These will be found of great value in designing new plants or in making preparation for rebuilding old ones.

Lone Star Company of Wichita Falls, Texas, has been incorporated by G. D. Anderson, J. A. Kemp and A. S. Goetz. Capital stock $100,000.

Eastern Trade Continues Active

Review of the Month Shows Much Activity and Many Reasons for Encouragement

THERE is no diminishing of activities in the sand, gravel and crushed stone industries in the different important eastern districts. With a settlement of labor difficulties in building circles at New York, there has come a renewed demand for commodities of this nature used in construction work, with prices showing a slight tendency towards higher levels. There is a good, healthy call for crushed stone for road operations in New York and New Jersey, and the market outlook for this specialty is decidedly bright. The price of good quality gravel, 1½-inch size, holds at $2.00 a cubic yard in carload lots, with ¾-inch material obtainable at the same quotation; dealers are asking $3.25 and $3.50 per cubic yard for this commodity, delivered on the job. High grade white sand is now selling in the New York territory for $4.00 a cubic yard, delivered. Building sand holds at $1.35 to $2.25 per cubic yard from the material dealers, while a price of from $1.00 to about $1.25 is asked per cubic yard in carload lots. The market for building stone is coming along in encouraging fashion, and stocks are now moving more freely; Gray Canyon sandstone is selling at 95 cents per cubic foot, delivered, and the better grade, Brier Hill sandstone, at $1.50 per cubic foot; good grade limestone is obtainable from the dealers at $1.23 to $1.35 per cubic foot. North River bluestone is quoted at $1.05 per cubic foot, delivered, while seam-face granite is selling for $1.00 per square foot.

Business continues active with the producers in New York state. At Geneva, the Geneva Limestone Com-

pany has increased its capital from $12,000 to $250,000 for proposed expansion. The sand, gravel and affiliated industries at Buffalo are hitting an encouraging pace, and a good winter season is anticipated. There is considerable new road work in this locality, and the call for crushed stone is strong.

The sand and gravel market at Philadelphia, Pa., has been moving a little slow, owing to a strike in the building trades. Good washed gravel is quoted at $2.30 per cubic yard, delivered on the job; building sand is selling at around $2.70, delivered. The De Frain Sand Company, with offices in the Finance Building, has acquired extensive property in Falls Township, Buck County, vicinity of Morrisville, for a consideration said to be about $200,000. The site offers a fine supply of sand, and operations will be conducted in this vicinity in the near future. The company in recent years has secured considerable sand from the Tullytown section, and has been operating a number of dredges on the Delaware River, near Morrisville. The city of Philadelphia is engaging extensively in road building and improvement work, and has recently awarded contracts aggregating $770,000 for street work. The Sidney Silica Sand Company, Philadelphia, a Delaware corporation, has increased its capital from $40,000 to $100,000 for proposed business extensions.

The Steacy-Wilton quarries, Bittingers Station, Gettysburg, Pa., set off the biggest blast at its local plant October 13 ever arranged at any quarry in the county. It is said that 118 cases of dynamite were used in 14 holes, which were drilled to an average depth of 69 feet. Approximately 30,000 tons of stone were brought down by the charge. The company is arranging for extensive production work at its plant.

There is considerable activity among the producers in the Pittsburgh district of Pennsylvania, and the way that the orders for material are coming in gives evidence of a still broader market in the immediate future. The Keystone Sand & Supply Company is busy with the shipments of large quantities of material to different points; the company has received a contract from the Government for sand and gravel to be used for concrete construction work at Dams Nos. 1, 2 and 3, on the Monongahela River, the order aggregating about 5,500 tons of sand and 13,500 tons of gravel. The Rodgers Sand Company will also furnish material for this same project at Dam No. 5, covering 3,000 tons of sand and about 7,000 tons of gravel. The Keystone company is making large shipments of sand for the new state highway in the vicinity of Rockwood, Somerset county, and has recently secured a contract for about 6,000 tons of river sand and gravel for the municipality of Beaver Falls; the company will also ship about 3,000 tons of sand and gravel for road work at Imperial. A. W. Dann, vice-president of the Keystone company, recently returned from a vacation trip to New York state. The Martinsville Sand Company has purchased a stern-wheel boat to add to its fleet, known as the F. L. Bowers; the vessel is 25 feet wide, 122 feet long and has a depth of 3.8 feet; it has a gross tonnage of 136 tons, and net tonnage of 97. The boat is steam-operated and was built in 1916.

The Pittsburgh Limestone Company, Williamsport, Pa., operating extensive quarries at Nessie, on the Potomac River, has resumed full operations at the works. The daily production is about 1,200 tons; the entire output of the quarries is used by the steel mills at Pittsburgh and vicinity.

L. R.

Information has been filed with the National Lime Association that at a meeting of District No. 4, Mr. Warner Moore was elected to serve on the board of directors.

ASSOCIATION ACTIVITIES

Men Change Name of Organization

Other Things Are Done in General Reorganization Which Is Being Effected

now the National Lime Association. The meeting on October at Washington, which was called purpose of taking some definite on the report of the committee organization, developed considerable spirited controversy in regard to fect the new plans might have future of the association.

following officers were elected e ensuing year: President, Warner, president Charles Co., Wilmington, Del.

President, George Nicholson, Jr., nt of the White Marble Lime anistique, Mich.

surer, A. H. Lauman, president al Mortar & Supply Company, rgh, Pa.

etary, Norman G. Hough, Wash- D. C.

Warner, the newly elected presi- was one of the half dozen lime acturers who some 15 years ago d the original National Lime ation. He has been a member association ever since, and it e unanimous opinion of the rship that no better man could ced at the association helm to rate the new policies.

chief problem the lime associa- as had to contend with has he lack of satisfactory promo- work to increase the sale of roducts. The plan of a strong organization to direct all publicity, promotional and research work, has been tried out but has failed to satisfy a group of manufacturers who represent a large proportion of the lime production of the country.

A new constitution was therefore adopted at this meeting which provides for several changes designed to work to the advantage of all the members. Perhaps the most important change is that which provides for extensive promotional work by district organizations. The general dues for the maintenance of the organization, which have been 4 cents per ton, have been changed to 2½ cents per ton. Where the special dues are not adequate tc finance a field organization in any given district, two or three districts may lump their special dues and conduct their promotional work with a single organization. The 2½ cents per ton general assessment cannot be used for the local promotional work, however, but these districts can obtain assistance from the general headquarters staff so long as they do not require actual field promotional work.

The new constitution also provides for the election of officers by ballot of the members of the 14 districts into which the industry is divided. Districts having an annual production in excess of 200,000 tons are entitled to two directors and those in excess of 400,000 tons to three directors.

The National Association staff is to be relieved of all detailed promotional work, and, in the interests of economy, the national organization will consolidate certain interests. The work which has been done by the construction bureau will be taken over by the district organizations, but the chemical and agricultural bureaus will continue

to be conducted as they have been right along.

Norman G. Hough, recently chief of the construction bureau and the newly elected secretary of the National Association, will be in charge of the headquarters at Washington.

Robert F. Hall, former general manager of the Lime Association, has resigned.

At a meeting of the staff committee President Warner appointed the following individuals to call a meeting of the manufacturers for the purpose of electing permanent directors to represent each district and to organize permanently:

Dstrict No. 3—J. K. McLanahan, Jr.
District No. 4—W. E. Carson.
District No. 5—Henry Angel.
District No. 6—Morgan Curtis.
District No. 7—Bernard L. McNulty.
District No. 8—R. C. Brown.
District No. 9—B.F. Pay.
District No. 10—J. M. Gager.
District No. 11—F. C. Cheney.
District No. 12—J. F. Pollack.
District No. 13—H. Dittlinger.
District No. 14—J. S. McMillin.

No general manager will be appointed to succeed Mr. Hall, but owing to the fact that matters are constantly coming up which ordinarily would be referred to that office, it has been decided, for the present at least, that these matters will be handled by a staff committee composed of the president, secretary, director of the agricultural bureau and director of the chemical bureau. The committee will hold meetings every Wednesday to discuss these matters.

On October 10, District No. 5 (State of Ohio) held a meeting at Cleveland and elected Mr. Henry Angel, of the Kelley Island Lime and Transport Company, and Mr. A. H. Lauman, of the National Mortar and Supply Company, as the two members of the National Board of Directors from that district.

President Charles Warner.

Districts Nos. 1 and 2 met in York on October 4 for the purp organization as outlined at the eral meeting for the creation o trict offices. As a result the E Bureau of the National Lime A tion was organized and Hen Camp was elected director o bureau. Fixed and special due prevail, the former providing f tablished overhead expenses an latter for special technical and service.

A further meeting of the E Bureau was held in Baltimore o 14, when a constitution, by budget and permanent fixed an cial dues of 5 cents a ton were ad An Advisory Committee was e composed of representatives of a members, and E. A. Grove, J. L nel and C. C. Bye were elected bers of the Board of Directors o National Association.

Mr. T. B. Shertzer, formerly e district engineer of the Lime A tion, will be associated with the ern Bureau, this arrangement t

come effective Nov. 1. He is at present engaged on some important promotional work for the State Highway Department, in New York State, and in order that this work may progress uninterruptedly his expenses for the month of October have been underwritten by some of the manufacturers in District No. 2.

Mr. Harry S. Owen, formerly western district engineer of the Lime Association, is doing important promotional work in District No. 7, and the manufacturers of that district have underwritten his expenses for October also.

Speed Up Pit and Quarry Production

Wisconsin Association Members Urged to Clean Up Present Business

THE Wisconsin Mineral Aggregate Association, Milwaukee, Wis., is capitalizing the remaining days of the season in an effort to get the members to move all the business possible.

O. E. Hubbard, executive secretary of the association, under date of October 16th, addressed a letter to the members in which he makes the following statement:

"Taking the average weather for the past few years, the majority of our members have about thirty days more to operate. Every possible effort should be made to ship all the business now on your books and where this business is held up on account of shortage of cars, the telephone and telegraph should be immediately resorted to, followed up by letter, and this office notified of such shortage. Railroad officials have shown inclination to assist us and where members have advised this office of a consistent daily shortage, have been able through the officials of the line on which they are located, to increase the supply. Let's continue to do this to a greater extent for the balance of the short period we have to clean up the business in sight."

The Steel Barrel

THERE seems to be every indication that the steel barrel is coming into its own. Of course the present uncertainty in steel production is having its effect in retarding developments in this direction; but that is merely a coincidence in the introduction of a radically new method of shipping which cannot long be delayed.

An air-tight metal container which will retain all the vitality of the product it holds, is in line with the present trend in the direction of efficiency and conservation, as well as the present merchandising policy in all lines which seeks to give the customer just what he pays for.

A steel barrel may cost more than a wooden one; but it insures the ultimate consumer full value for his money, rather than giving him a product which may have lost much of its original quality by the time it gets to him.

The steel container is also a money saver for the lime manufacturer and the dealer; because it enables them to manufacture and buy without having to take so closely into consideration the conditions of immediate supply and demand.

Altogether the steel barrel is going to prove a boon to all concerned.

The Ladd Lime & Stone Company, of Cartersville, Ga., will erect a $100,000 addition to its local plant, and machinery will be installed to make hydrate masons and finishing lime. The hydrating plant will have a capacity of 100 tons of finished lime daily. The company will continue to run its extensive crushed stone business as formerly.

Bagging of Talc, and Other Problems

Production of Talc Rapidly Increasing—Mechanical Packers Highly Desirable

FINISHED ground talc from the final grinding and separating machinery may be elevated or conveyed to large storage bins which will hold half a day's output or more, or to small bins which have no storage capacity and serve merely as hoppers from which the talc is bagged, usually by hand. Opinions differ as to whether the storage bin should be used or the talc bagged directly, says a recent Bulletin of the Bureau of Mines. The arguments in favor of the use of a storage bin are: (1) Bagging machines may be used, by which talc may be weighed out into burlap or paper sacks rapidly and accurately with greatly reduced labor; (2) The product from the grinding plant, running three shifts, may be stored and all sacked by machine in one shift; (3) Breakdowns in either the grinding or the bagging departments will not cause delays in the department unaffected; (4) Talc can be sacked either by hand or machine, whereas without storage capacity machines are used ineffectively or not at all.

The main arguments opposed to the use of storage bins are (1) that the mill product cannot be changed from one grade to another without emptying the storage bins, but this could be obviated by the use of one reserve bin kept empty for this purpose, (2) that if impurities or off-grade stock go through the mill by accident a whole bin full of talc may be ruined or lowered in grade, (3) that a closer check may be kept on the product and necessary changes made sooner if no bins are used. These last two arguments really amount to the same thing and can be overcome by taking and testing samples at frequent and regular intervals from the chute which discharges into the storage bin. Irregularities may be detected in this way and checked before appreciable damage is done.

From all the evidence now at hand the use of storage bins for finished ground talc, in conjunction with some forms of mechanical packers, seems highly desirable.

The production of talc in the United States has increased about 90 per cent in the last ten years. During this period the production of ground talc has increased about 115 per cent. This indicates a great expansion in the use of this grade of material, and suggests the possibilities of even greater expansion under favorable conditions. These conditions can be brought about through technical research and publicity. Over forty uses for talc are now known, of which only a few have been exploited at all extensively. The principal uses of ground talc at present are in the paper, paint, rubber, roofing, and toilet powder industries.

Technical research in the production and utilization of talc should include both field and office studies. Some of the definite problems which are worthy of investigation are suggested below:

1. *Field Problems*:

Study of methods of mining to produce most efficiently a clean, dry product.

Study of most efficient methods of crushing and grinding, grading and sizing to produce a pure, clean, uniform product free from grit, and of good color.

Solution of detail problems of milling, such as the economy of dryers, the use of bagging or packing machines, etc.

Study of methods of utilization of talc in consuming industries in order to determine more accurately the most suitable grades and sizes for each use.

II. *Laboratory Problems*:

Study and tabulation of physical and chemical properties of talc from each producing district.

Study of behavior of talc in combination with other compounds in order to discover new uses: for example, a study of the colloidal properties of talc.

Standardization of grades, sizes, and tests so that uniform products may be marketed from different districts.

The solution of any or all of these problems would be of great benefit not only to the producers but to the consumers. The producers would benefit by the reduction of waste, increase of safety and efficiency, lower costs and wider markets, while the consumers would benefit by uniformity in grades and sizes and accurate knowledge upon which to base specifications and choice of the most suitable grade for each use.—From Bulletin of Bureau of Mines.

Whipple Resigns

Big Loss to Lime Association—Sidney P. Armsby to Serve Temporarily

MR. A. D. WHIPPLE, chief engineer and director of the Chemical Bureau of the National Lime Association, has resigned that position, effective November 1st.

Mr. Whipple has been engaged in a great deal of important investigating work, and with such degree of success, that his resignation at this time will constitute a great loss to the association.

Steps are being taken to fill his place, but in the meantime it has been deemed advisable to appoint Mr. Sidney P. Armsby, technical assistant, temporarily, pending the appointment of Mr. Whipple's successor.

Big Agstone Meeting At Columbus

Secretary Sandles Announces Aggressive Campaign for Promotional Work for 1920

THE National Agricultural Limestone Association will hold a meeting in Columbus, Ohio, November 18th. A dinner will be tendered the association members in the evening, to which prospective members will also be invited. Representatives of agricultural colleges, experiment stations, granges, county agents, and leading farmers have been invited to this "get-together" of business and pleasure.

Mr. A. P. Sandles, secretary of the association, states that the business part of the program will be devoted to the discussion and fixing of "an aggressive promotion policy for 1920."

"Perhaps no new industry has ever gained such tremendous momentum as the Agstone business has done in the past twelve months," he continues. "Farmers are getting next to the fact that soil needs agricultural limestone the same as they are set on having salt on taters at meal time. The high price of clover seed ($30 a bushel) has made the farmer sit up and take notice that he will be throwing clover seed away if he throws it on sour soil. Seed at 50 cents a pound makes him cautious before throwing away half dollars."

"Send Bulletin No. 6"

A bulletin entirely devoted to derricks and locomotive cranes has recently been issued by the Edward F. Terry Manufacturing Company, Grand Central Terminal, New York City. These pieces of equipment were designed orginally by men who were closely identified through the construction and material-handling field, so that they are planned to fit the requirements of men in this industry. A copy of the bulletin will be sent on request. Ask for Bulletin No. 6.

Mitchell Electric Vibrating Screen

With 3,600 vibrations of the screen cloth per minute, produced by an entirely new application of mechanical principles, the Mitchell electric vibrating screen offers one of the most interesting achievements of recent years in the development of screening devices.

It is the invention of B. A. Mitchell, chief mechanical engineer of the Utah Copper Company, and has been in practical operation for more than two years in that company's plant in Garfield, Utah. Recently exhibited at the A. I. M. E. convention and the exposition of chemical industries at Chicago, it attracted wide attention. It is being installed in plants that screen a variety of material, such as sand, gravel, coal, ore salt and sugar, and wherever put into operation it is said to have achieved exceptional success.

The Mitchell is a complete departure from established screen construction. It does away entirely with devices for tapping the surface of the screen cloth. Instead, it produces a strong, persistent, upward motion of the screen cloth by means of electric power applied from beneath.

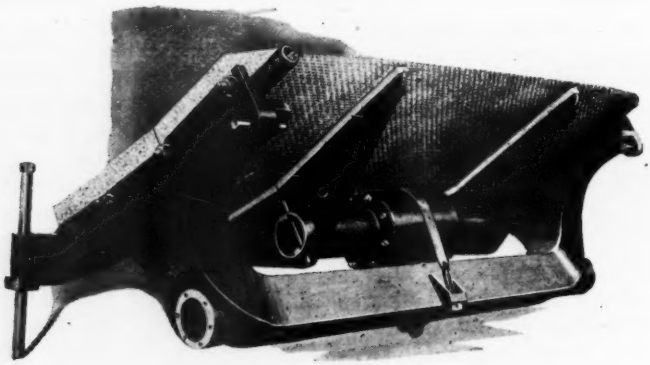
The vibrating mechanism of the Mitchell consists of a casing enclosing an electric motor at the center, through which runs a long shaft. The mechanism operates on a ball and socket joint at the point of contact with the screen frame, where it is fastened to the frame by means of a steel strap passing over the center of the casing, as shown in the accompanying illustration.

Each end of the shaft is thrust through a hard fibre cylinder about four times the diameter of the shaft and known as the ball cage, from the fact that it contains radial bored round holes into which are fitted steel balls. Encircling the ball cage and pressed tightly in the tubular casing are hard steel ball races.

In operation, one or two adjacent rows of holes are filled with balls in the ball cage at each end of the shaft. Any particular row of balls at one end of the shaft is counterbalanced by a similar row of balls at the other end of the shaft, but the two rows are 180° apart with reference to the circumference of the shaft.

When the ball cage is rotated by the motor, centrifugal force causes the balls to travel to the inside periphery of their respective races with such force that gravity is reduced, and the mechanism, being free to rotate at its center at the ball and socket joint, an eccentric motion is produced at either end of the mechanism. This motion may be roughly illustrated by holding a pencil tightly at its center with the thumb and first finger of one hand, and with the other hand moving one end of the pencil in a slight circular path.

By varying the rows of balls or number of balls in a row in the ball cage at each end of the shaft, the strength of vibration can be accurately regulated. The vibrating mo-



Mitchell Electric Vibrating Screen.

Elevating, Conveying

and

Power Transmitting MACHINERY

for

Gravel, Sand and Stone Plants

SCREW AND BELT CONVEYORS.

BUCKET ELEVATORS, with buckets on chain or belt, furnished with or without steel casings.

BUCKETS—standard types in steel or malleable iron, steel buckets of special design made to your specifications.

GEARS—MACHINE MOLDED or with CUT TEETH.

CHILLED RIM SPROCKETS.

CHAIN—standard malleable detachable, Ley bushel, steel or malleable roller.

SHAFTING, PULLEYS, BEARINGS, FRICTION CLUTCHES.

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H. W. CALDWELL & SON CO.

CHICAGO

Western Ave., 17th and 18th Sts.

tion is that of a compound double conical pendulum acting on a horizontal axis.

The motion of the vibrating mechanism is transmitted to the top screen surface by means of rigid vibrating arms or plates which fit snugly on and are firmly held to each of the tapered ends of the vibrator casing by means of wedges. The plates are so constructed that the cloth is slightly higher where it comes in contact with these plates than where it is fastened to the main frame. This assures a constant contact between the screen cloth and the vibrating mechanism.

The vibrator keeps these arms and consequently every wire and every mesh in the screen cloth, describing a minute circular path in the direction of the top of the screen. In other words, if you stand facing the screen with the lower end to your left, the motion of the screen cloth is clockwise. The result of this circular movement is that every particle of material not immediately liberated is tossed back along its path across the screen cloth.

With the screen cloth describing this circular movement and striking the material with an impact of from 500 to 1,000 pounds at a frequency of 3,600 a minute, the Mitchell, it is declared, can handle a huge tonnage with absolute thoroughness in the screening and at a remarkably low operating cost.

In coarse crushing work at the Utah Copper Company's mill each Mitchel screen is delivering a screened product of more than 1,200 tons per 24 hours of minus ½-inch material. In fine crushing, dry work, each Mitchell is delivering a screened product of more than 700 tons per 24 hours of minus 10-mesh material. In fine crushing, wet work, each Mitchell is delivering a screened product of more than 750 tons per 24 hours of minus 10-mesh material.

The screens in this installation require only ⅜ H. P. each. The entire installation of eight screens is delivering close to 12,000 tons of screened product per 24 hours with a power consumption of only 3 H. P.

The Mitylene Gravel & Sand Co., Montgomery, Ala., with a capital stock of $30,000 has been incorporated. Incorporators: Ed. Stallings, C. R. Gleason, Gordon Reynolds, E. B. Young and R. J. Edgerly, all of Albany, Ga.

Wellman Geared Bucket

A bulletin recently issued by the Wellman-Seaver-Morgan Company of Cleveland, Ohio, is devoted to describing and illustrating the Wellman geared bucket. Regarding the reason for the development of this bucket, the catalogue states:

"Throughout the entire field of handling bulk materials, such as coal, sand, gravel and cinders, the use of clam-shell buckets has been attended by expense and serious delays necessitated by the renewal of operating cables or chains.

"The ordinary construction of a clam-shell bucket is such that a large quantity of the material handled comes in contact with the operating parts of the bucket.

"The inevitable result is—excessive wear of those parts, due to the abrasive action of the material, and subsequent delay and expense in removing and renewing the worn parts.

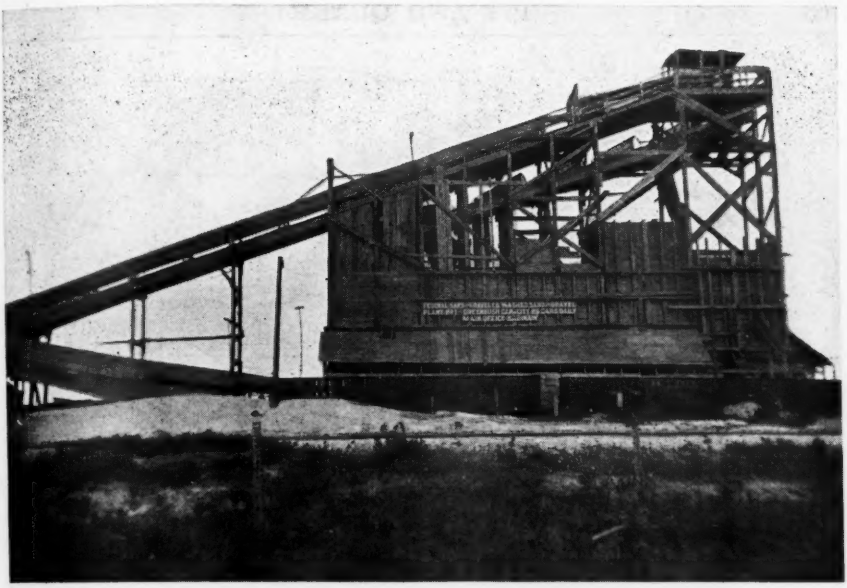
"With the idea of eliminating these faults, The Wellman-Seaver-Morgan Company has developed a bucket—built in accordance wth approved mechanical principles; possessing highly efficient digging qualities, minimum head room, and low center of gravity, combined with neat appearance and durability.

"All of the working parts are completely enclosed in a tight casing, where they are constantly lubricated and where they do not come in contact with the material the bucket is handling.

"The bucket is composed of a minimum number of parts so arranged as to facilitate the removal of any part in case of necessary repairs. It has no expensive chains or ropes reeved on small sheaves, no complicated parts or difficult adjustments. It is simple, compact and efficient."

New Zelnicker Catalogue

The Walter A. Zelnicker Supply Company of St. Louis has recently issued a new Catalogue No. 370, which will be sent by the company on application of any reader of PIT AND QUARRY. It covers 26 pages and shows a large amount of the equipment for sale by this company, both new and second-hand.



Rebuild Your Old Plant and Get Increased Capacity

BE PREPARED to get your share of the big volume of business which is sure to come next spring. Don't postpone action until the eleventh hour.

We are now revising many small plants—increasing the output and general efficiency, and getting a better product.

The illustration shows the plant of the Federal Sand & Gravel Co., Saginaw, Mich., originally built by us in 1911. We have just completed additions to this plant, giving an increased capacity of approximately 50%.

Let our experienced engineers look over your plant. No doubt they can suggest a plan that will increase your output.

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LINK-BELT
Sand and Gravel Plants

We Also Make
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Link-Belt and Sprockets
Silent Chain Drives
Buckets
Electric Hoists
Locomotive Cranes
Wagon Loaders
Screens

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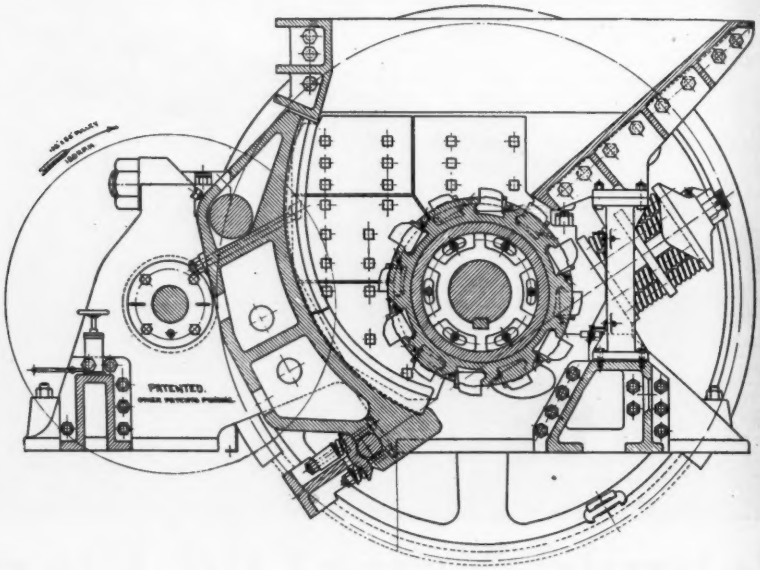


New Crusher Catalog

A new crusher catalog is that of the Allis-Chalmers Co., Milwaukee, regarding the Fairmount type of crusher, known as Bulletin 1456.

The Fairmount crusher, like all other crushing machines, contains a fixed and moving crushing element. The stationary element in the Fairmount crusher consists of a curved anvil, the crushing surface of which is lined with chilled iron wearing plates. This anvil is held in its position in relation to the frame by heavy steel tie rods co-acting against a powerful nest of springs, which are provided for taking up or equalizing the excessive shocks and pressures.

Acting against this anvil is a roll with removable teeth. This roll is so located with relation to the anvil that preliminary fracturing of large pieces of rock admitted to the crusher is effected by the sledging action of the teeth or knobs of the rotating roll on the rock as it rests by gravity upon the roll. This action is intensified by having the teeth of different heights. The roll is mounted on a heavy shaft running in massive journals, one of which is properly designed to take up the end thrust.

Secondary crushing of the material is accomplished by direct nipping and crushing of fragments of the preliminarily fractured rock between the roll projections and the anvil. It also is intensified by having the teeth of different heights.

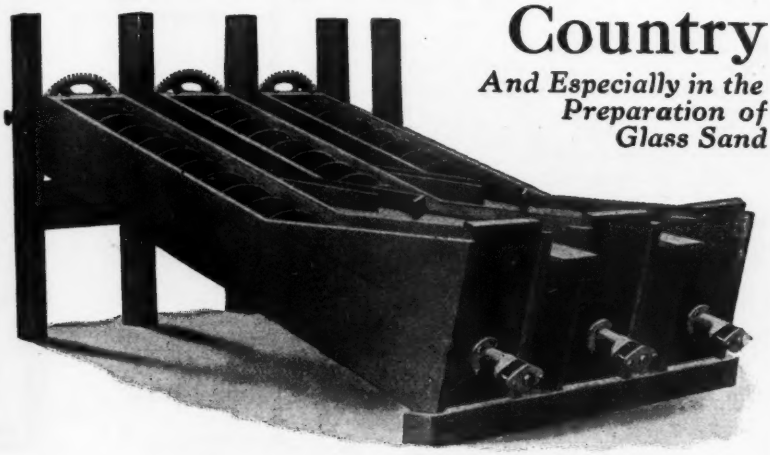
Beaumont Crushers

A recent catalogue of interest to those who use rock crushers is that issued by the Beaumont Manufacturing Company, 315 Arch street, Philadelphia, known as Catalogue No. 32. It is devoted entirely to describing and illustrating the Beaumont rock crusher. The action of the crushing jaw in this machine is secured by means of a cam-shaped shaft which gives two strokes of the jaw to every complete revolution of the fly wheel. The wearing plates are made of high carbon steel bolted on the inside of crusher, one on each side of opening, and are reversible four times.

The Brown-Gordon Company, which was formed in Lansing, Mich., last spring by Claude Gordon and W. L. Brown to do a general gravel and sand business, has been incorporated with a capitalization of $25,000, all of which is paid in. W. L. Brown is president; Robert Y. Spier and Claude E. Gordon, vice-presidents; C. L. Ludwig, secretary-treasurer. The company owns a fleet of 30 motor trucks and is motorizing all its equipment.

Used in Some of the Largest Quarries in the Country

And Especially in the Preparation of Glass Sand



LEWISTOWN

Sand Washers

These are reasonably priced, well built, compact outfits, which can be easily and quickly installed. They are simple in construction and efficient in operation. Extensively used in the manufacture of glass sand which is so much needed today in the making of optical lenses for field glasses, telescopes, etc., required by the Government.

If you are not acquainted with Lewistown equipment and service, it will pay you to look into it.

We are in position to assist you solve your problem of whatever nature, if it pertains to crushing, grinding, screening, washing, drying and conveying, as we manufacture a full line of this machinery and equipment. Drop us a line stating what you desire information on.

Lewistown Fdy. & Machine Co.

LEWISTOWN, PENN.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney. Continental Trust Building, Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,317,194. Rock-drill. Axel B. Kjellgren, Gottenborg, Sweden.

1,317,366. Mine hoisting apparatus. Warren E. Greenough and Sherwin B. Davis, Spokane, Wash., and Anton Kragtorp, Mullan, Idaho; said Davis and Kragtorp assignors to said Greenough.

1,317,586. Tunneling apparatus. James O. Mack, Alexandria, La.

1,317,697. Excavator and side cutter. James C. French, Chicago, Ill., assignor to Frederick C. Austin, same place.

1,317,812. Mining-machine. Ralph E. Noble, Chicago, Ill., assignor to Morgan-Gardner Electric Co., same place.

1,318,389. Feeder for crushers and pulverizers. Paul S. Knittel, St. Louis, Mo., assignor to American Pulverizer Co., same place.

1,318,692. Dump-car. Jay B. Rhodes, Kalamazoo, Mich., assignor to Western Wheeled Scraper Co., Aurora, Ill.

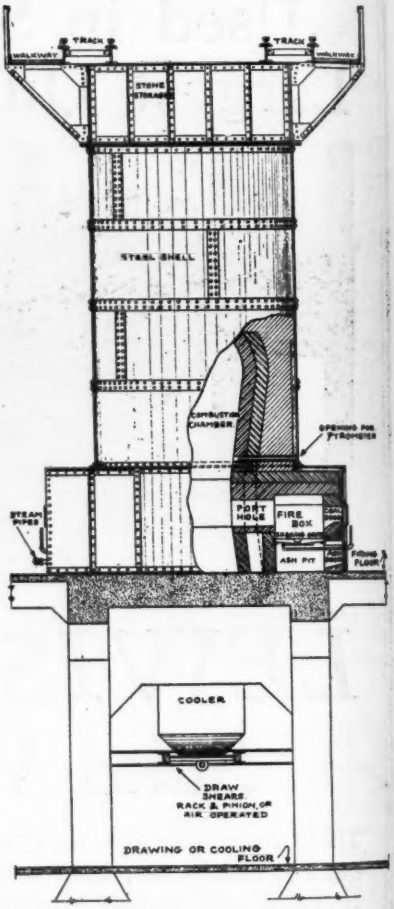
1,318,840. Mining-drill bit and coupling. David J. Williams, Herrin, Ill.

Pumps at Constant Efficiency

The Barnes Manufacturing Co., Mansfield, Ohio, is now producing an outside packed plunger pump which meets the requirements of the quarryman in his washing plant. This pump, the Hercules duplex, is practically unaffected by sand which may be carried in suspension by the water, on account of the large clearance between plungers and cylinder walls. It has no piston packing or brass cylinder linings to be replaced and the glands through which the plungers work are readily accessible from the outside, requiring only an occasional turn of a wrench to keep the pump at constant efficiency.

Arnold Lining for Kilns

The illustration herewith shows the side view of a typical installation of the Arnold lining for lime kilns. This



lining is something which has recently been devised and the patents covering it are controlled by Arnold & Weigel, contractors and engineers, Woodville, Ohio. It is a lining of special shape that can be installed in practically any steel shell with fire boxes ranging in size from 10 to 18 feet in diameter and 20 to 40 feet in height.

Standard fire brick shapes are used, and laid in such a way that the lining when complete resembles a bottle. This lining differs from all others in four distinct broad features of design. It has a continuous flow storage hopper for stone, neck, choke and combustion chamber.

Steel shells with Arnold linings installed are producing from 15 to 40 tons of lime every 24 hours.

A Great Invention—The Haiss Path Digging WAGON LOADERS

(PATENT PENDING)

Self-Feeding, Self-Propelling, Self-Crowding

Booklet No. 219 Tells How the Wonderful Feeding Propellers Do Their Work. Write for it Now

THE GEORGE HAISS MFG. CO. 142d St. and Rider Ave., NEW YORK CITY

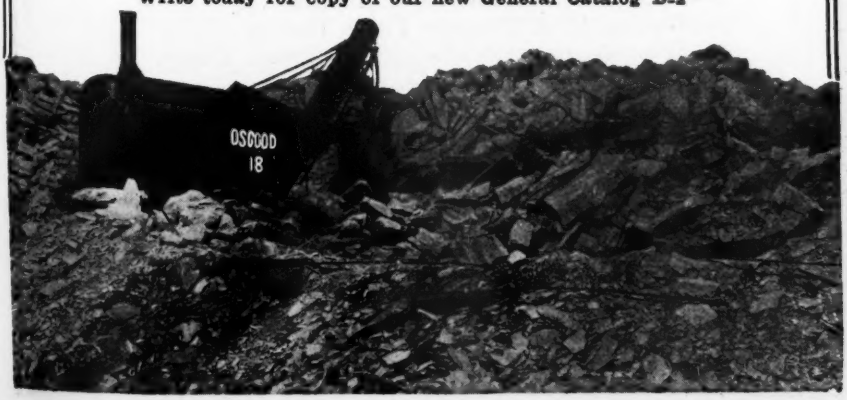
OSGOOD 18 ¾ yd. Traction Revolving Steam Shovel

is a splendid investment and one that has earned substantial profits for many companies operating Stone Quarries, Sand and Gravel Pits, etc. Its wide range of action and high dump make it especially popular.

THE OSGOOD COMPANY

MARION, OHIO

Write today for copy of our new General Catalog D-2



USED EQUIPMENT BARGAINS

Steam Shovels

Special attention is called to the following thoroughly overhauled shovels. Good as new.

1—Bucyrus 70-C, 2½-yard, shop No. 1712
1—Bucyrus 18-B, ⅞-yard, shop No. 2189; on caterpillar traction, full revolving.
1—Model 28 Marion, ⅝-yard dipper, No. 3137.
3—Marion 60 Shovels, Nos. 1995, 1999, 2059

LOCOMOTIVES

8—18-ton, 10x16″ Dinkeys, 36″ gauge
2—12-ton, 9x14″ Dinkeys, 36″ gauge
1—10-ton, 7x12″ Dinkeys, 36″ gauge
1—14x20″ standard gauge saddle tank
2—11x16″ standard gauge 4-wheel saddle tank

DUMP CARS

50—12-yard Western standard gauge
25—K. & J. and Oliver wood beam, 36″ gauge

PUMPS

1—Novo Centrifugal Pump, 4″ suction, 4″ discharge
1—F. M. Centrifugal Pump, Size 5.
2—Emerson No. 4 Pumps
2—Barnes Diaphram No. 1. Pumps
2—Barnes High Pressure Force Pumps
1—Worthington 12x17x10x15″ Steam Pump, for 140 lbs. water pressure.

SPREADER CARS

1—Western Narrow gauge spreader

All equipment we offer is thoroughly repaired before shipment

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USED EQUIPMENT BARGAINS

Cooley's Equipment Bargains

BOILERS

1—75 H.P. Johnston Bros. Locomotive Type Boiler, 45 in. dia., 18 ft. long. Double Butt Strapped Hollow Stay-bolts, 125-lb. pressure.

1—42x105 Upright Boiler.

CLAM SHELL BUCKETS

1—1 yd. Industrial Clam Shell Bucket.

1—1-yd. Browning Clam Shell Bucket.

3—2-yd. Brown Hoist Coal Buckets.

JAW CRUSHER

1—12x15 Acme Portable Jaw Crusher mounted on steel trucks—equipped with elevator and revolving screen. Complete plant. Bargain. Write for price.

1—14x20 Aurora Jaw Crusher with 22-ft. elevator.

SHOVELS

1—No. 0 Thew full revolving traction shovel equipped with a ¾-yard dipper and an Ohio butt strapped boiler carrying 120 lbs. pressure. Also combination boom. Shovel in first-class condition. Shop No. 1139. Ready for immediate shipment. Guaranteed Bargain.

1—70C Bucyrus R. R. type shovel, equipped with a 2½-yard dipper.

CARS

10—12-yard Western Dump Cars, equpiped with air brakes, hand dump; guaranteed to pass over any railroad on their own wheels.

62—1½ Koppel Cars, 24-inch gauge.

28—Western 4-yard cars, 36-inch gauge.

36—Continental 4-yard cars, 36-inch gauge.

GRAVEL WASHING OUTFIT

1—Stephens Adamson gravel washing outfit, complete with No. 2 Aurora Crusher and 59-ft. elevator. Used on one job. Fine condition.

ROLLER

1—10-ton J. I. Case 3-wheel, double-cylinder Steam Roller, Shop No. 23594, equipped with extra front tractor wheels and axles to convert roller into tractor. Also 42 detachable spurs for each rear wheel for scarifying. Exceptionally low price.

MIXERS

1—No. 2-10 Koehring Steam Traction Paving Mixer. Spouting machine. This machine is in excellent condition and looks like new.

1—No. 10 Rex Chain Belt Paving Mixer, steam operated. Equipped with spout discharge. Capacity 2 bags.

1—No. 6 Koehring Steam Paving Mixer, A-1 condition.

GYRATORY CRUSHERS

1—No. 5 Style K Gates Shop No. 7224. The only difference between this and a new crusher is the price. Guaranteed to pass any inspection.

also

3—No. 4 Gates.
1—No. 3 Gates.
1—No. 6 K Gates.
1—No. 4 K Gates.
1—No. 8 K Gates.

1—No. 7½ Austin.
1—No. 5 Symons.
1—No. 8 McCulley.
1—No. 3 McCulley.

HOISTING ENGINES.

1—6¼x8 Lidgerwood contractor's double-drum, double-cylinder hoisting engine, complete with boiler.

1—8¼x10 American double-drum, double-cylinder, reversible hoist with boiler.

1—Double Drum Double Cylinder. 7x10 Lidgerwood Hoist with boiler.

1—8¼x10 Three Drum American Hoist with Ohio Boiler.

LOCOMOTIVES

1—18x24-inch, 6-wheel Baldwin Switching Locomotive, 45 tons, Federal inspection for 150 pounds pressure.

1—18x24-inch Schenectady 6-wheel Switching Locomotive, 45 tons, Federal inspection for 150 pounds pressure.

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We are in the market for used Equipment of all kinds—

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Write us giving full description,

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FOR SALE

CRUSHERS

1—No. 21 Gates Gyratory
2—No. 12 Gates Gyratory
1—No. 10 Gates Gyratory
1—No. 10 Kennedy Gyratory
1—No. 9 Gates Gyratory
3—No. 8 Gates Gyratory
4—No. 7½ Assorted Gyratory
6—No. 6 Assorted Gyratory
3—No. 5 Assorted Gyratory
8—No. 4, 3 and 2 Assorted

PULVERIZERS

12—Hammer Pulverizers
15—Sets Crushing Rolls
35—Griffin Mills
8—Ball & Tube Mills
2—Symons Disc Crushers
15—Kent Mills
3—Pebble Mills
3—Sturtevant Mills
4—Burr Mills 3—Raymond Mills

GRINDERS

1—60x84 Jaw Crusher
10—10x20 to 36x48 in.
6—Portable Jaw Plants
4—Coal Crushers
3—Tipples
6—Ore Washers
8—Channeling Machines
Conveyors—Screens
Stripping and Loading Shovels, Cars and Cranes

1—No. 12 Gates K, Manganese fitted, $7,500
1—No. 10 Kennedy, Manganese fitted, $6,500
1—No. 10 Gates K, Manganese fitted, $7,000
1—No. 9 Gates K, Manganese fitted, $6,000
1—No. 8 Gates K, Brand New, $7,000
1—No. 8 Gates L, First Class, $3,500

We have
Crushers,
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Cars, Drills
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Direct connected
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Ask us first,
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1—No. 7½ Gates K, New Manganese fitted, $4,500
1—No. 7½ Gates D, Manganese fitted, $2,000
1—No. 7½ Gates K, Fine Condition, $2,750
1—No. 6 Kennedy, New Manganese fitted, $2,000
1—No. 6 Gates K, Fine Condition, $2,000
1—No. 6 Kennedy, Fine Condition, $1,500

The above are only specials from the number we have for sale. Space does not permit us to give the specials on the **Jaw Crushers** and **Pulverizers**, but we have them. Just ask us **first**—then **last**.
Would you be interested in a **Complete Jaw Crushing Plant**, 150 to 200 tons daily capacity, at $1,500?
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Quarry Specialties
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1— 30 H.P. Upright 200
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1— 50 H.P. Upright 700
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2—20x24 Blake, each..... 2,000
1—No. 4 Gates Gyratory..... 1,000
1—10x20 Blake 750

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1—2¼-yd. Bucyrus 500
1—¾-yd. Browning with boom and engine (new) 750

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8—Chicago Pneumatic Tool Co. 3¼ in. drills, each..... 100

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1—5-ton Stiff Leg with steel bull wheel 500
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1—200 H.P. Allis-Chalmers Corliss. 1,250
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1— 70 H.P. Erie Center Crank..... 300
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1—Westinghouse 250
1—150 H.P. Stillwell Bierce..... 150

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2—6¼x10 American Hoist and Derrick with boiler at $750 each.... 1,500
2—6x8 Contractors' Plant Co. S. C. S. D., at $200 each..... 400
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1—9x10 D. C., 3-drum Cableway Engine 1,500

LOCOMOTIVES

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1—Porter Standard Gauge Saddle Tank, 14 tons..... 2,000

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1—No. 5 Pulsometer..... 100
1—Wilson-Snyder Water Works, 3,000,000 gals. per day..... 1,500

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LOCOMOTIVES
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1—10x12 double cylinder, Flory Hoist, with three drums and attached swinger with butt strap boiler, just like new.
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1—Type "B" Erie, fully revolving, ¾-yard dipper, traction wheels.
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1—BALDWIN, 40-ton (4) four-wheel, saddle tank, fine condition.
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2—Davenport, 24-inch gauge.
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15,000 feet, 24-in. gauge, with steel ties, 20-lb. rail.
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We offer, subject to prior sale, 25 1-yd. capacity skip-cars.

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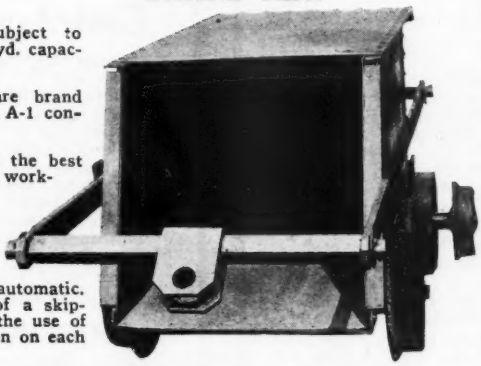

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Ohio Locomotive Crane, 15-ton, 8-wheel, M.C.B., 40 ft. 48 in., butt-strapped boiler, full steel house, double drums for bucket; completely overhauled.

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1—15	General Electric	1200
3—15	Fairbanks-Morse, slip-ring, constant speed	1200
1—15	Westinghouse, vert.	1135
2—15	Allis-Chalmers	1130
2—15	Allis-Chalmers	860
2—15	Westinghouse	850
4—20	Westinghouse	1750
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1—1-yard Orange Peel Bucket.

All in excellent condition and ready for immediate shipment.

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1—60x84-in. Power and Mining Jaw.

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5—15-ton American Steel Guy Derricks, 100-ft. booms, 115-ft. masts, with bull wheels.
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2—8¼x10 Lidgerwood Cableway Engines.
1—10x12 Flory Cableway Engine.
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2—40x15-in. "Anaconda" Sand Rolls.
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1—400 H.P. Squirrel Cage G. E. Motor for 3 phase, 60 cy., 2,200 v. current.

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28-ton Std. Gauge Locomotive.
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1—Ingersoll 860′ steam driven compressor.
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1—40-ton four-driver saddle-tank.
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1—40-ton 17x24-in. four-wheel switcher.
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2—50-ton 18x24-in. six-wheel switchers.
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1—1-yd. Foote concrete mixer, with 20 H.P. boiler.

Locomotive crane, steam shovels, narrow and standard gauge cars, etc.

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50 or 60-ton Steam or Electric Shovel, on traction wheels preferred. Also 12 steel Quarry Skips, about 42 cu. ft. capacity.

Give price and condition in first letter.

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65-ton Bucyrus steam shovel mounted on locomotive trucks with 2½-yd. dipper, good condition, now in service. $4,500.00.

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Bucyrus steam shovel, ½-yd. traction.
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Six Lee Loaders, complete, 2 cubic yards capacity.

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2—No. 6D Gates Manganese fitted crushers.
1—No. 8 C. & W. Gyratory crusher.
1—No. 3 crushing plant complete.

Send us your inquiries.

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Revolving Thew Shovel, 1¼-yard dipper, on railroad wheels, bought for government contract. Only used four months. Excellent condition, ready for immediate shipment.

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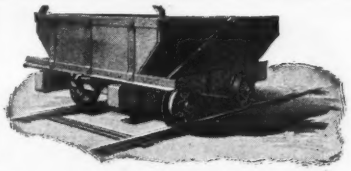

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Four Maney self-loading scrapers, one yd. size, new; also two I. H. C., 45 H.P., heavy oil tractors, in fine condition, ready for work.
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12 seven-ton, all-steel, end-dump cars, 42" gauge; seven new, five slightly used. Address K. T. 2, care of PIT & QUARRY, 538 S. Clark St., Chicago, Ill.

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Gates K. 8 New Gyratory crusher.
Bucyrus 225 B. shovel.
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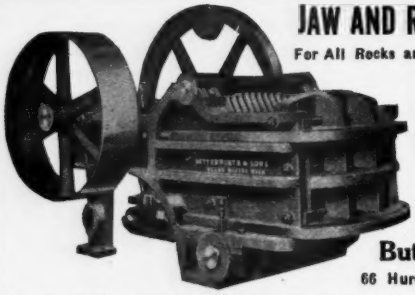

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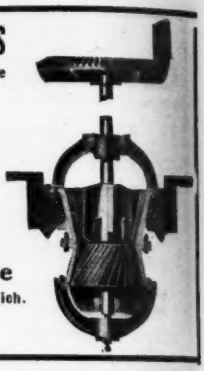
For All Rocks and Ores Softer Than Granite

GYPSUM MACHINERY

We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

SPECIAL CRUSHER-GRINDERS FOR LIME



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Nippers—17x19", 18x26" 20x30", 24x36" and 26x42".

Rotaries—20" to 47" inside diameter. Many variations.

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HEAVY SERVICE

Grab Buckets

MANUFACTURED BY

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Office and Works, 6539-41 Metta Ave.

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Established 1863 Incorporated 1902

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NEW PARTS AND REPAIRS FOR STONE CRUSHERS

PROMPT SERVICE

Manganese Steel Jaw Plates, Cheek Plates, Rolls, Screens, Shafts, Eccentrics—Every Part for Any Crusher

Union Steel Rivetless Chains

"The Chain of Double Life"
Fits Cut and Std. C. I. Sprockets
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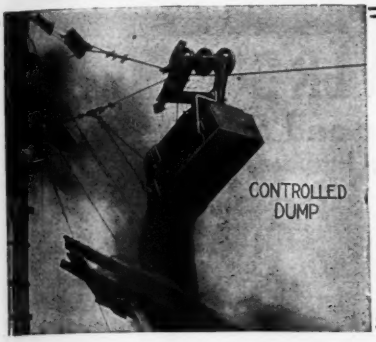
High Carbon Links (STRENGTH) Large Glass—Hard, Reversible Bearings (DURABILITY), One-Piece Rivetless Construction (PERMANENCY) insure Trouble-Proof Money Saving Service. Bushing Chains, Roller Chains, Attachment Links, Buckets, Sprockets, Elevators, Conveyors, etc.

THE UNION CHAIN & MFG. CO. **Seville, Ohio.**



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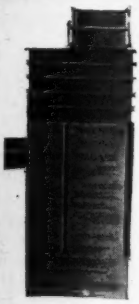

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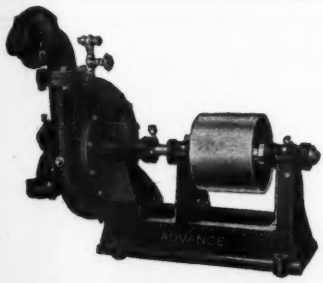

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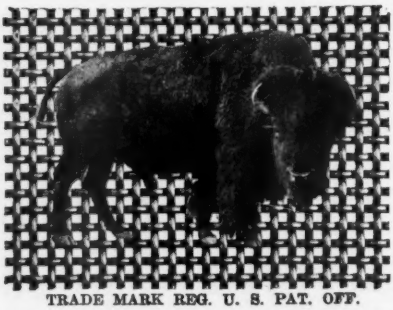

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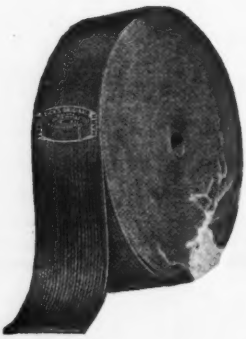

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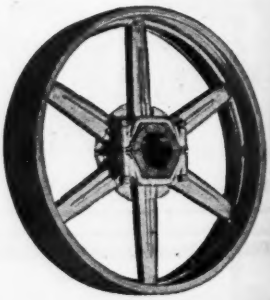

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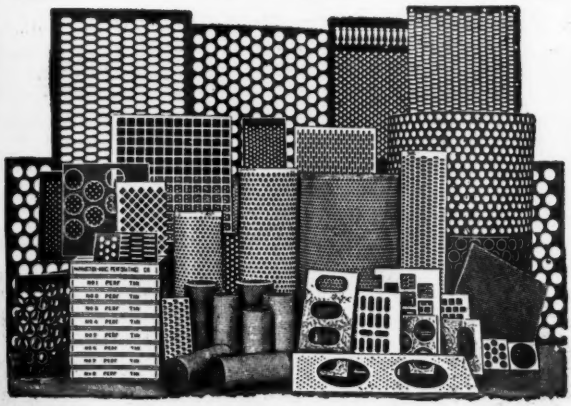

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STONE,
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And All
MINERALS

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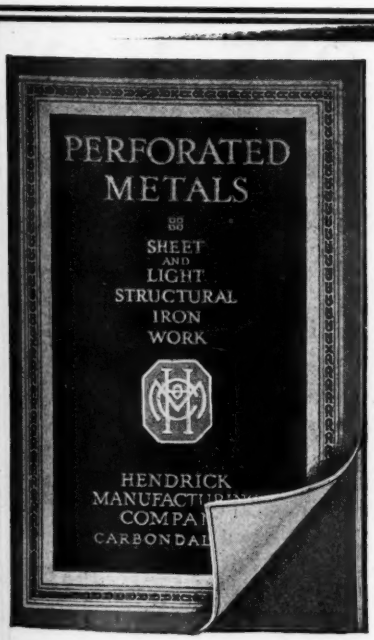

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Elevator Buckets

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STEAM GASOLINE ELECTRIC POWER

Excavating, Stripping, Material Handling, Car Unloading, Derrick Work,

Road Wheels, Caterpillar or Rail Truck Mounting. "There's an Auto-Crane for your work, too."

Here is one of Byers' Steam Caterpillar AUTO-CRANES performing in a gravel pit for A. J. Mallinger, at Duncombe, Iowa.

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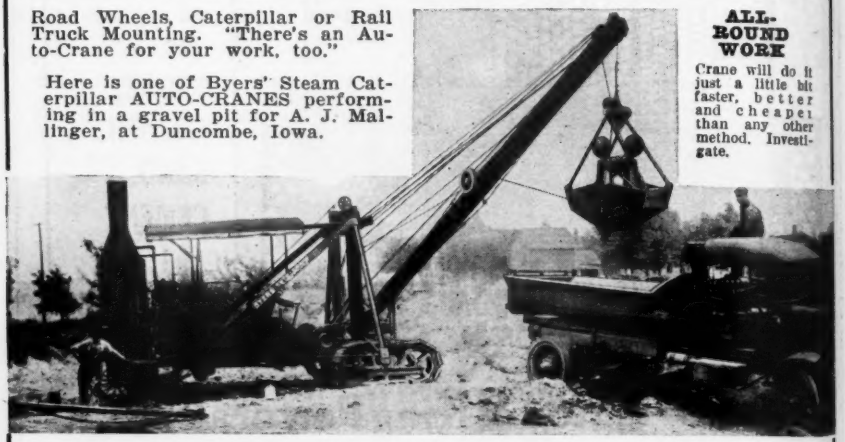
Crane will do it just a little bit faster, better and cheaper than any other method. Investigate.



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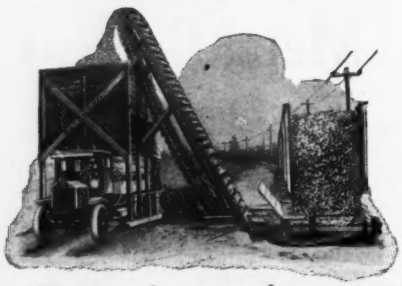
THINK OF ONE MAN



Being Able to Handle a 50 Ton Car in Ninety Minutes

That's what can be accomplished with the SUNBURY AUTOMATIC UNLOADER which has set a new standard for a day's work.

The SUNBURY can do it in less time and is the connecting link between profit and loss. Write for catalogue and investigate this wonderful machine.

THE SUNBURY MANUFACTURING CO.

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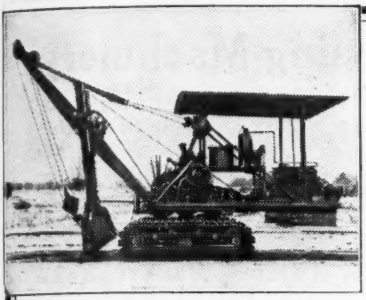

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Combination Dragline
A PIONEER IN THE FIELD

Dragline Bucket—Clamshell Bucket —Skimmer Scoop—Shovel Arm and Bucket—Back Action Digging Arrangement

FIVE MACHINES IN ONE

It is adaptable to any sort of work, such as excavating, street grading, ditching, loading and unloading gravel, coal or other materials. There is always work for it to do and each combination works as efficiently as the other.

The machine is of medium weight construction, the 5 combinations are easily interchangeable. No drums have to be added. Multipedal traction distributes the load. Two speeds forward; steam or kerosene power. It is not an experiment—there are dozens of them in action over the country today. You will find this Austin Dragline a safe investment.

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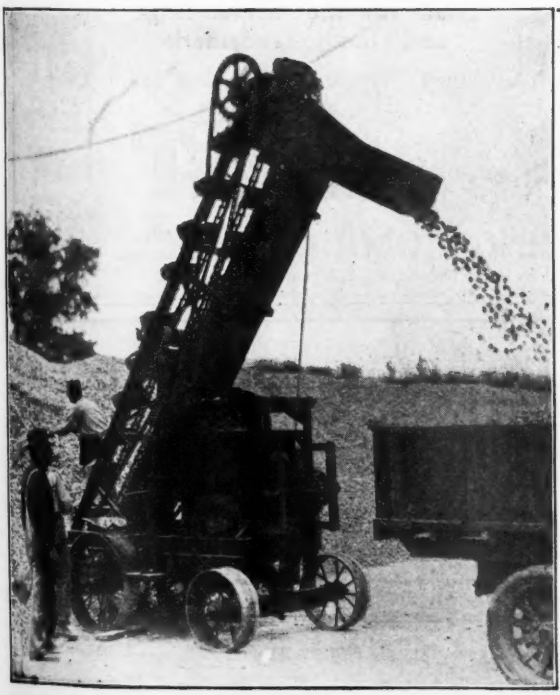

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Self-Propelling
LOADERS

Loading the Atlas Way, spells economy and efficiency in handling sand, crushed stone or gravel.

Let an Atlas Loader be one of the means to help solve your labor problems. Loaders built for handling coal and other loose material.

Write us what your wants are and let us tell you how you can handle your material cheaper and better. Write for

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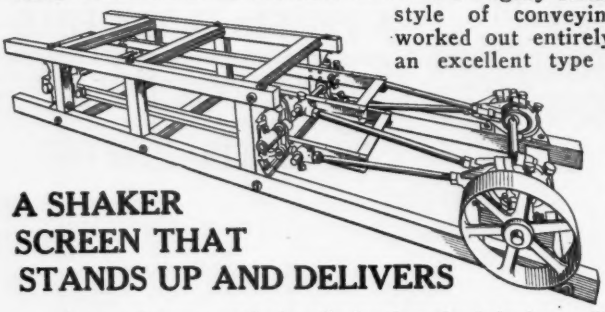
Our equipment for handling all classes of products will cut your costs considerable—a low first cost and a mighty small upkeep. Our style of conveying rollers has worked out entirely satisfactory—an excellent type designed especially for handling all gritty substances. We combine large capacity, little power, positive oiling, durability.



A SHAKER SCREEN THAT STANDS UP AND DELIVERS

A new feature entirely eliminating the injurious effects of previous machines—a balanced action not found on any other type. Works smoothly, easily and effectively. Puts the material through rapidly, well graded and in quantities that will please you.

New Catalog Now Ready. Write for Your Copy.

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OVER 1000 USERS

FOR STORING AND RECLAIMING, LOADING AND UNLOADING CARS, TRUCKS AND WAGONS

DOES THE WORK OF FROM 6 TO 12 MEN

AND KEEPS EQUIPMENT MOVING

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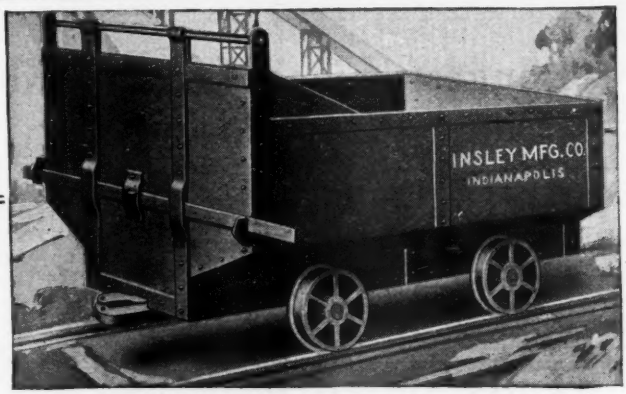


Sound Engineering Combined with Sturdy Construction

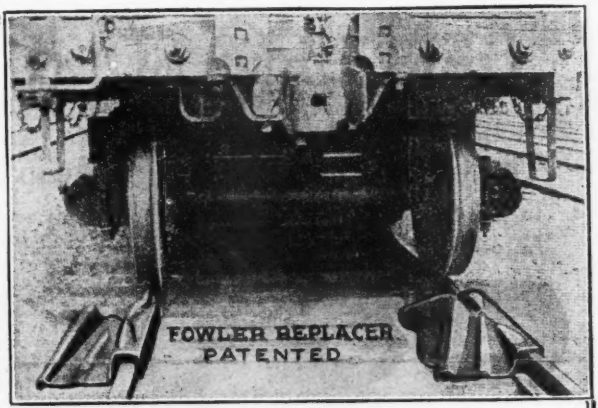
makes Insley Products the predominating Equipment in the industrial field. By understanding and visualizing in advance the work a product must perform, the average conditions under which it must perform it, and how fast it must be able to handle the work if properly manned, and then building these things into the equipment is the reason why.

You will be interested in the proposition we can offer you on cars, track, switches and turntables.

INSLEY MANUFACTURING CO., INDIANAPOLIS, IND.

They're Pretty Nearly Worth Their Weight in Gold—

when a derailment occurs and things are tied up.



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Fabricated of flange pressed steel, reinforced

Have tremendous sustaining power, yet are reasonably light in weight. Enable the replacing of a heavily loaded car or engine in a few minutes. Can be handled by one man. Their cost is trifling compared to their usefulness, even as insurance if nothing else. Built in two sizes.

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Track Equipment Co., Huntington, W. Va.

The Longest Lived Steam Shovel Chain Ever Produced

TAYLOR MESABA

Cuts down expenses,
Eliminates waste time,
Increases your yardage

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"HERCULES SOLID WELD"

STEAM SHOVEL CHAIN

The Chain That Puts the Shove in Steam Shovels

In use for many years. Will not open at weld or go to pieces before it actually wears out.

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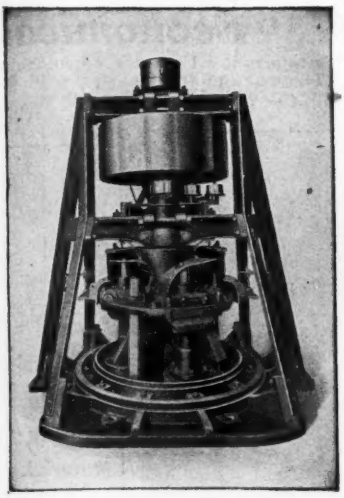

The Perfect Agricultural Limestone Pulverizer

THE BRADLEY 3 ROLL MILL

Produces a very fine, uniformly-ground product at minimum cost. A mill built to meet the demands of the most exacting trade.

Produces a fine-ground product cheaper than most other machines when producing coarse materials.

Finishes in Single Operation

We are prepared to furnish complete plans for agricultural limestone plants.

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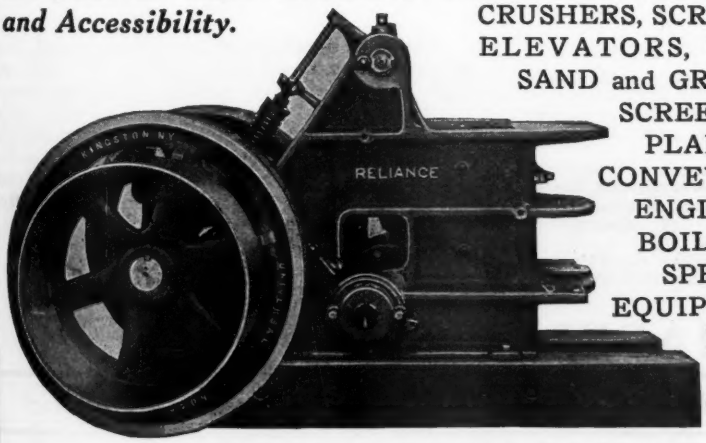
Designed for High Efficiency, Low Up-keep, Durability and Accessibility.



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"UNQUESTIONABLY THE BEST—AND CHEAPEST"

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Universal Road Machinery Co.

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Sturdy Efficient Economical

Dumping Equipment **"Made By Heil"** is guaranteed to give dependable service for a maximum period of time. The particular attention paid to design and workmanship make Heil Equipment especially serviceable.

For Hauling: Gravel Sand Cement Lime and All Bulk Building Material.

Quality Dump Body and Hydro Hoist.

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The best hydration costs the least!

Operates continuously and automatically.

Permits the greatest capacity on finishing mills.

Prevents re-crystallization of very quick limes.

Produces greatest percentage of amorphous product.

Properly co-ordinates with other units of plant.

A very superior quality of hydrated lime can be produced from either high calcium or dolomite limes at a substantial saving of power, labor and space—with Schaffer Lime Hydrators. At the same time, the Schaffer provides a flexibility of operation that makes it adaptable to every market condition. In every detail a "Schaffer Quality" product.

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Continuous! Automatic!

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The "Bulldog" Bend-proof Shaft

means tremendous savings in your gyratory expense account. It means continuous operation—day after day—year after year—at maximum efficiency—with no lay-offs for repairs.

The Traylor "Bulldog" Gyratory Crusher

shaft, designed by engineers who are acknowledged the foremost experts in their line, is shorter and 100% stronger than any other gyratory shaft.

More than that, the "Bulldog" Gyratories are cool-running even under the hardest usage, due to their larger and longer eccentrics and perfect lubrication.

There are many other features just as important—among them the Hewes Spider and the cut steel gears that run in oil—all of which are fully described in the booklet: "Building the Largest Crusher in the World."

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Weight
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For 20 years the Kingsford Sand Pumps have been acknowledged the standard. Made in all sizes.

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ADAMITE
(PATENTED)

There are scores of wearing parts in your mills and quarries for which this Super-Carbon Alloy is most suitable.

"Adamite" is the high-efficiency material for crusher-jaws, eccentrics, pulverizer rings and rolls, liner plates, tires and rolls for cement mills, gears, pinions, etc. Wherever the wear and tear is continuous and severe, "Adamite" will **insure increased** tonnage and **decreased** costs.

What are your present needs?

PITTSBURGH IRON & STEEL FOUNDRIES CO.
Executive Offices, Pittsburgh, Pa. Foundries, Midland, Pa.

GRINDING MILLS USED IN ALL OF THE
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ROLLER MILLS WITH AIR-SEPARATION

IMPACT PULVERIZERS WITH AIR-SEPARATION

For handling such materials as Clay, Coal, Gypsum, Hydrated Lime, Limestone and Phosphate Rock.

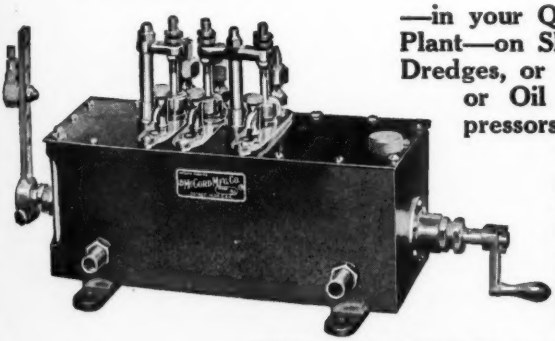
Our No. 13 Catalog gives you full information

RAYMOND BROS. IMPACT PULVERIZER CO. 1307 Branch St. CHICAGO

Pit, Quarry and Mill POWER PLANTS

Not Affected by Change of Temperature

Regulate it once—and thereafter your McCord Force Feed Lubricator will deliver just the right amount of oil—at just the right time—in just the right place—regardless of the most sudden temperature changes. With McCord Force Feed Lubricators you can eliminate any lubrication trouble you may be having



—in your Quarry, Pit or Power Plant—on Shovels, Locomotives, Dredges, or Pumps—Steam, Gas or Oil Engines and Compressors.

Type B-A McCord Force Feed Lubricators, pictured here are specially designed for severe outdoor service. There is a McCord for every need—and a need for every McCord.

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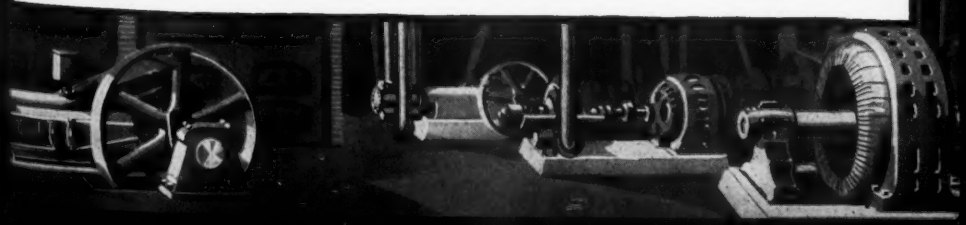
McCord Mfg. Co., Inc., Detroit, Mich., U. S. A.

TYPE B-A **McCord FORCE FEED Lubricators**



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ELEVATING *and* CONVEYING MACHINERY

Equipment for

Pit and Quarry Use

Including

Bucket Elevators--Belt Conveyors

Wagon Loaders

Screens—Chutes—Chain

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Established 1814

Gifford-Wood Co.

MAIN OFFICE
AND WORKS
HUDSON, N. Y.

Chicago Office, 565 West Washington Street
New York Boston Buffalo Philadelphia

Pulverized Coal for Fuel

The use of pulverized coal for firing stationary boilers was advocated before the recent Detroit convention of the American Society of Mechanical Engineers, by Frederick A. Scheffler and H. G. Barnhurst.

The authors started out on the assumption that present-day practice in firing boilers has reached its maximum efficiency, and that if we are still further to conserve our coal fields and reduce operating costs, some other method of firing must be adopted.

In this connection they suggest the use of pulverized coal, and give the following data with reference to the cost of this method.

The cost of pulverizing the coal is of prime importance as low costs are essential for success and are achieved when the quantity used per day of 24 hours exceeds 100 tons. The cost of pulverizing is made up of a number of items as follows:

Power.
Repairs and maintenance.
Coal for drying.
Labor.
Interest.
Depreciation.
Insurance and taxes.

The power required in an up-to-date pulverized coal plant is from 12 to 13 kw-hr. per net ton of coal crushed, dried and pulverized. The additional power required for transferring the coal to the point of use and feeding it to the boilers will vary considerably, depending upon the distance transported, the size and number of the boilers, and the conditions under which they operate. The power required for this latter service varies between 4 and 6 kw-hr. per net ton, so that the total power for the entire process from the track and storage delivered to the boilers is 17 or 18 kw-hr. per net ton. In the following paragraphs the cost of power has been assumed at ¾ cent per kw-hr.

The item of repairs, including material, labor and general upkeep of the plant or maintenance, for the entire pulverizing plant and burning equipment will vary from 7 to 10 cents per net ton of coal handled. The figures depend upon local conditions, and the size and general arrangement of the entire installation.

The item of coal for drying depends directly upon the percentage of moisture and upon the price of coal. Ordinarily only from 1 to 1¼ per cent of the total amount of coal used is required for drying. Assuming coal to have an average of seven per cent moisture as received and the cost to be $2.50 per net ton, the cost per net ton of drying the coal will be 3 cents. At $5 per net ton the cost of the drier coal will be 6 cents.

The item of labor is the greatest variable in connection with the pulverizing of coal, due to the increased output that can be obtained in larger plants per man employed. It is also subject to local rates of wages. For example, assuming labor at 40 cents per hour, a plant of 100 tons daily capacity, properly designed and equipped, will require approximately 34 labor hours to prepare the fuel and deliver it to the conveyors, whereas in a plant having a daily capacity of 1,000 tons, approximately 115 labor hours are required. Therefore the labor cost would be 14 cents per net ton in a 100-ton plant, only 4 cents per net ton in a 1,000-ton plant, and as low as 2½ cents per net ton in a plant of 5,000 tons daily capacity.

The interest item is based on a 6 per cent of the entire investment, and the cost of the pulverized-coal plant and burning equipment will, of course, vary considerably with the conditions under which the plant is installed. Roughly speaking, however, the actual investment will vary from $12.80 per kw. output in a 5,000-kw. plant down to $4.80 per kw. in a 50,000-kw. plant and $4.12 in a 100,000-kw. plant (assuming a turbo-generator water rate of 16 pounds and continuous boiler and furnace efficiency of 75 per cent). All these figures in relation to cost are based on the present high prices. The investment required for a 5,000-kw. plant using 100 tons of pulverized coal daily, approximately $240,000, so that, on a basis of 6 per cent and allowing for 365 days continuous operation, the interest item will vary from 10½ cents per net ton in a 1,000-ton plant down to 3.9 cents per ton, in a 100-ton plant.

Depreciation in a coal-pulverizing plant is usually calculated as follows: The life of the building is considered as 40 years, of the coal driers as 15 years and of the balance of the equipment as 20 years. With a 100-ton pulverized-coal plant and burning equipment the depreciation item will be approximately

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12 cents per net ton, and in a plant of 1,000 tons daily capacity it will be approximately 4 cents per net ton.

Taxes and insurance are based on 2 per cent of the entire investment and for a 100-ton plant this item is approximately 3½ cents per ton and for a 1,000-ton plant, 1.3 cents per ton. Summarizing, the foregoing results show that the total cost of pulverizing and delivering coal to boilers is approximately as given in Table 1. The cost of the puverizing equipment complete compares favorably with the stoker equipment when everything, such as coal-and-ash-conveying machinery, etc., is taxen into consideration, and in large plants, it is considerably less.

Right and Wrong Position for Firing

In order that the fireman may place the coal to best advantage he must take a proper position in front of the furnace, so that he can see the thin spots in the fuel bed and with least effort can throw the coal where it is needed. A proper position for firing the left door is indicated in figure 1 by the footprints. The fireman is standing 4½ to 5 feet from the front of the furnace and 12 to 18 inches to the left of a straight line running through the center of the left door. In this position he is about 2 feet from a coal car, placed 6 to 7 feet from the front of the furnace, and can swing his scoop from the coal car into any place on the left side of the furnace, nearly in a straight line, so that he has to use comparatively little effort. At the end of the throw the scoop is suddenly stopped by laying it on the bottom edge of the fire-door frame as shown in figure 4; the coal slides off the scoop and is scattered over the thin spot.

With reasonable practice the fireman can throw the coal on any desired spot in the fuel bed, and by stopping the scoop on the bottom edge of the fire-door frame saves himself a disagreeable jar. A skilled fireman placing the coal with graceful movements of the shovel is a pleasing sight. An unskilled fireman wears himself out by bringing the scoop into the furnace door and by jerking it back to make the coal slide off. This method is tiring, but may do if the furnace is not very deep. However, with deep furnaces it is very difficult to get the coal far enough back and to spread it where needed.

The placing of the coal car or the coal pile is of importance in order to fire efficiently. The best place for it is 6 to 7 feet directly in front of the furnace, as shown in figure 1. The coal can be held in a coal car of about 1,000 pounds capacity, or it may be used whenever possible, because it keeps the boiler room cleaner and makes the handling of the coal and the fires easier. Thus, for instance, when the fires are being cleaned the coal car can be pushed out of the way so that the fireman has a clear space to work and handle the fire tools. The coal car may run on an iron track or it may have flat wheels and run on the hard, preferably con-

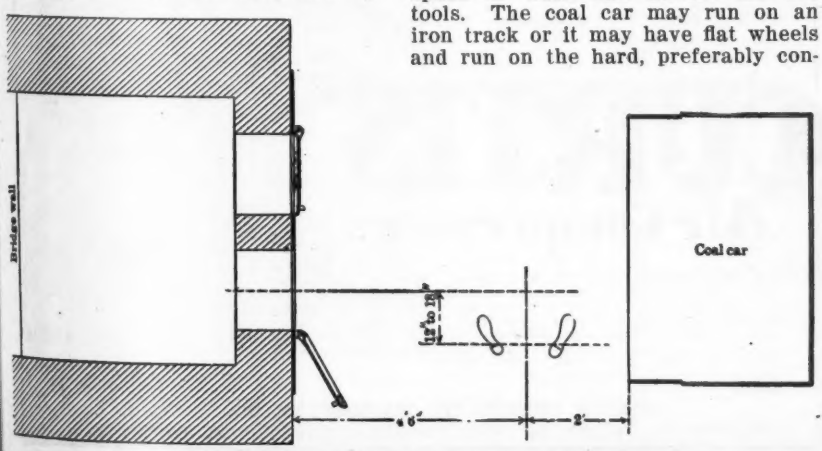

Fig. 1—Proper Position of Fireman When Firing Furnace

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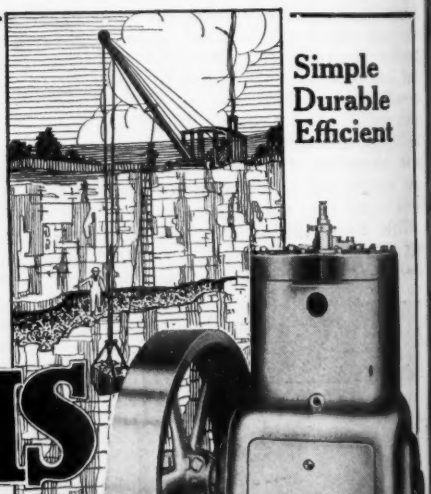

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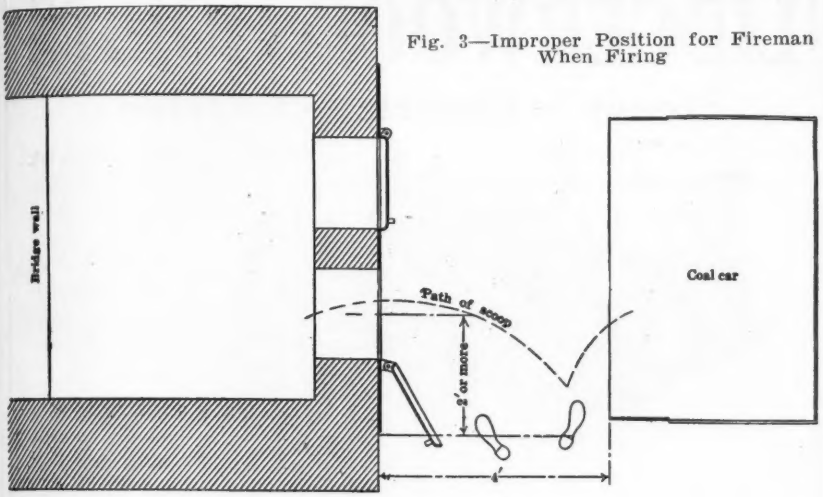

Fig. 3—Improper Position for Fireman When Firing

crete floor of the fireroom. One side of the car should have at the bottom a swinging hinge so that it can be swung down level with the bottom of the car, thus making the shoveling of coal easy.

If the coal is kept on the floor, the coal passer should not be allowed to place it too near the furnace or to scatter it over a large space. The place where the fireman stands should always be free from coal and from any other objects, such as fire tools, so that the fireman can stand firmly when firing.

There are many boiler plants, some of them of considerable size, which have very small firing floors, so that the fireman has not enough clear space to take the best position for efficient firing. The coal car may be placed on the track less than 4 feet from the front of the furnace. Then the fireman has not room enough to swing his shovel properly, and it is hard for him to place the coal where it is needed. When firing he must stand too close to the furnace and be exposed to the intense heat radiated by the fire. To avoid some of this heat he stands so far to one side of the door that he can not see the surface of the fuel bed and throws the coal into the furnace by guess. His scoop travels in an arc of a circle instead of moving in nearly a straight line.

As the scoopful moves around the curve some of the coal usually drops off, and is scattered over the firing floor or falls into the ash pit. The fresh coal, instead of being spread over the thin spots, is usually thrown over the front part of the grate where it accumulates in heaps. The rear part of the fire receives much less coal and frequently is full of holes.

Under such conditions the fireman must frequently level the fuel bed by pushing the coal with the rake to the rear of the grate where he cannot place it with his scoop. Thus the fireman, although he has to do considerable extra work, gets low efficiency because of the large excess of air that enters the furnace through the holes in the rear of the fuel bed or through the open fire door. Also, the coal dropped from the shovel not only makes the fireroom look untidy but makes it harder for the fireman to walk around and to attend to his furnace.

The working conditions in a small fireroom, such as that described, are worse when no coal car is used and the day's supply of coal is dumped on the firing floor. Often, on account of lack of room, the coal is piled within 3 feet, or even less, of the furnace. There is not enough foot room for the fireman to stand in a good position so that he can see the surface of the fuel bed and place the coal where it is needed. With such conditions economical firing is out of the question. However, the poor results obtained in the boiler must not be laid to the fireman, but to the designer of the plant.

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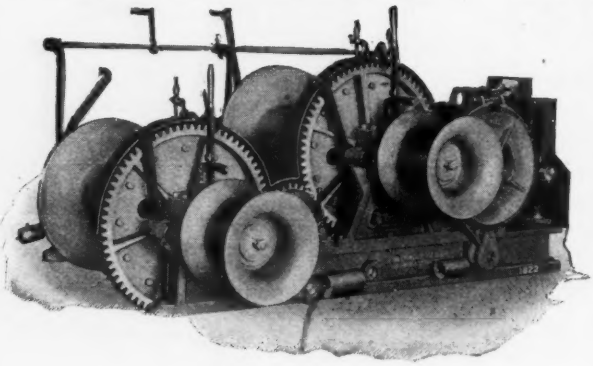

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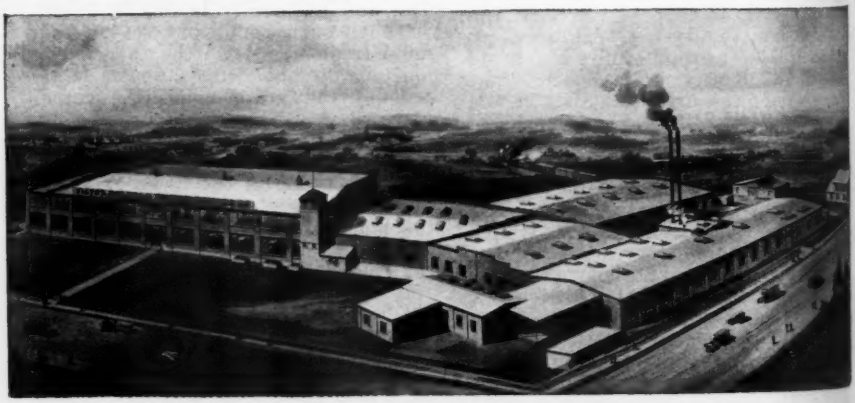

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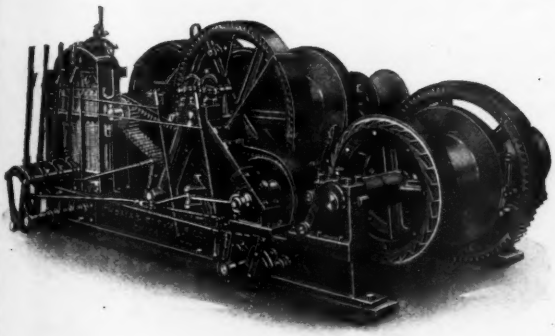

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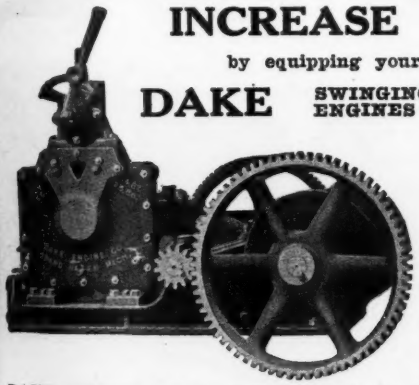

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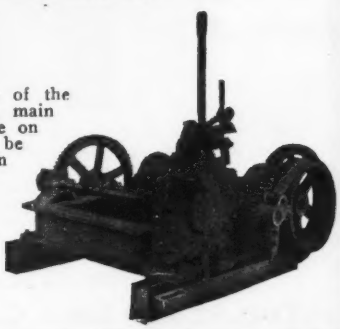

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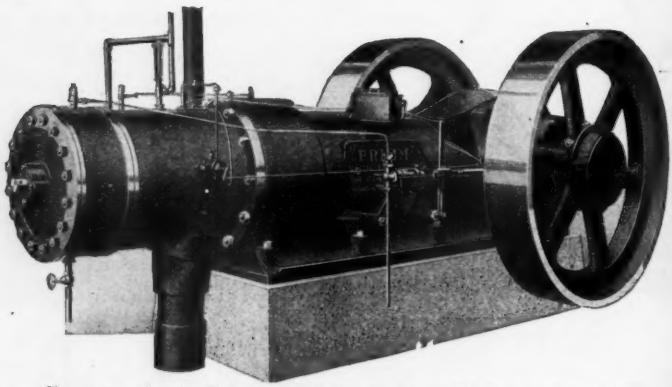

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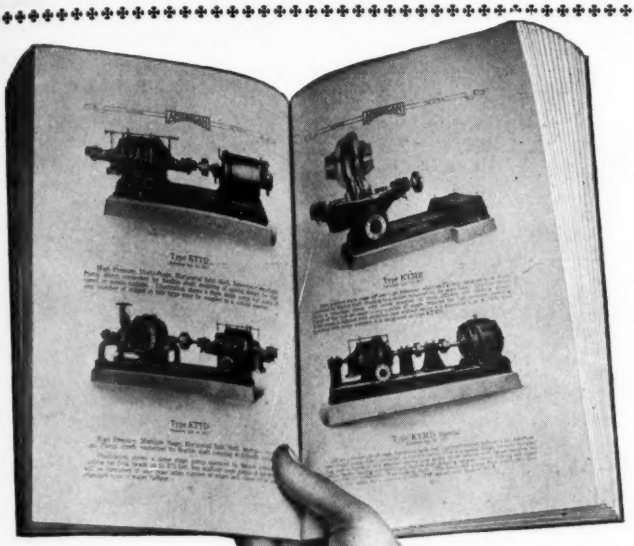

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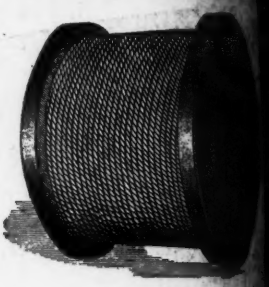

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